PROCEEDINGS

OF THE

# TWELFTH ANNUAL MEETING

OF THE

# Florida State Horticultural Society

HELD AT

**JACKSONVILLE, FLA., May 2, 3, 4 and 5, 1899.**

**Compiled by the Secretary.**

**PUBLISHED BY THE SOCIETY.**

---

PRESS OF
E. O. PAINTER & CO.
DELAND, FLA.
1899.

# CONTENTS.

## INITIAL PAGES.


Frontispiece
Officers and Committees ... IV
List of Members—Honorary, Life and Annual ... VI
Constitution and By-Laws ... X


## PROCEEDINGS.


Minutes (Giving all the events and transactions of the meetings in the order of their occurrence, but omitting papers, reports, discussions, etc., which appear on subsequent pages under topical heads.) ... 1
Address of Welcome, by Hon. R. D. Knight ... 6
Address of Welcome, by Capt. C. E. Garner ... 7
Response to Address of Welcome ... 9
President's Annual Address ... 10
Report of Special Committee on Local Arrangements ... 15
Damage from Cold.—Modifying Effects of Moisture.—Hammock Groves vs. Pine ... 16
Damage from Cold and Best Methods of Prevention.—The Action of Cold.—Replies from Fifty Correspondents.—Suggestions for Protection Based on the Practice of Florida Horticulturists ... 19
Protection of Trees.—Forest Protection.—Hammock and Pine.—Coal Fires.—Sheds for Trees ... 33
Root Pruning as a Protection Against Cold ... 36
Some Climatic History.—Range of Temperature, Its Cause and Effect ... 37
Spraying With Water.—As a Protection Against Cold.—Effect on Citrus and Deciduous Trees, Pineapples, Tomatoes, etc ... 40
Is Our Climate Changing?—The Minimum Temperature of Florida Winters Since 1833—Discussion ... 42
Shedding for Orange Groves.—It Would Probably be a Profitable Investment ... 47
Restoring Frozen Trees.—A Practical Plan Based on Experience ... 49
Citrus Fruits ... 50
Tent Protection of Trees ... 51
Effect of Shade.—Influence of Sheds and Shade on Quantity of Fruit—A Discussion ... 54
The Patric Device for Protection of Trees.—A Cylinder Inclosing the Tree.—A Small Heater at the Bottom.—Illustrated ... 56
Report of Committee on Diseases and Insects of the Citrus ... 59
Citrus Hybrids.—Possible Future of a Union Between the Common Orange and the Trifoliate.—Earlier Hibernation, Later Blooming—Discussion ... 62
Some Florida Insects.—Notes on the Garden Flea Hopper, the San Jose Scale, and the Cottony Cushion Scale—Discussion ... 65

Report of the Committee on Peaches and Plums.—Protection from Cold by Banking, by Open Fires, by Shedding ..... 71
Irrigation for Peaches.—Observations on General Culture—Discussion ..... 72
Report of Committee on Vegetables.—Observations During the Past Winter in Manatee County ..... 74
Cassava Culture.—A Discussion ..... 73
Horticultural Quarantine.—Resolutions and Bill Presented by the Committee Appointed for That Purpose—Discussion ..... 78
Growing Strawberries in Frames.—Discussion.—Canes and Umbrella Stocks ..... 80
Figs.—A Discussion ..... 83
Grapes.—The Scuppernong.—A Desirable Variety for Florida ..... 84
Tropical Fruits.—A Discussion ..... 86
Report of Committee on Hardy Shrubs and Trees.—Ornamentals Suitable for South Florida—Discussion ..... 87
Pineapple Fertilizers.—Geology and Soils of the Lower East Coast.—Discordant Views of the Growers.—Interesting and Valuable Tests Instituted by the State Experiment Station.—Great Number of Formulae Tried ..... 90
Marketing Fruit.—A Discussion ..... 96
Irrigation.—For Watering and as a Way of Preventing Frost—A Discussion ..... 98
Report of Committee on Forestry ..... 100
The Exposition at Omaha.—Florida Should be Represented.—Remarks of the State Delegate and Other Members.—A Discussion ..... 102
Grafting vs. Budding ..... 104
Tropical Fruits.—How They Were Affected by Cold ..... 106
Jamaica Sorrel ..... 107
Melon Culture ..... 108
Report of the Secretary, H. G. Hastings, from May 4, 1898, to Jan. 1, 1899 ..... 109
Report of the Secretary, Stephen Powers ..... 110
Annual Report of Treasurer for 1899 ..... 112
Annual Report of Executive Committee ..... 112
Election of Officers ..... 113
Place of Meeting ..... 114
Special Resolutions ..... 116
Final Resolutions ..... 117
Necrology ..... 118

# FLORIDA STATE HORTICULTURAL SOCIETY.

## OFFICERS-ELECT FOR 1899.

### PRESIDENT.

GEO. L. TABER, Glen St. Mary.

### VICE-PRESIDENTS.

DR. GEO. KERR, Pierson; GEO. W. WILSON, Jacksonville; E. N. REASONER, Oneco

### SECRETARY.

STEPHEN POWERS, Jacksonville.

### TREASURER.

W. S. HART, Hawks Park.

### EXECUTIVE COMMITTEE.

LYMAN PHELPS, Sanford, Chairman; E. S. HUBBARD, Federal Point.
H. B. STEVENS, DeLand.

### STANDING COMMITTEES.

CITRUS FRUITS.—Rev. Lyman Phelps, Sanford; M. S. Moremen, Switzerland; A. H. Crane, Nashua.

DISEASES AND INSECTS OF CITRUS.—Prof. P. H. Rolfs, Lake City; A. J. Pettigrew, Manatee; C. H. Baker, Grasmere.

PEACHES, PLUMS AND PEARS.—G. P. Healy, Jaffery; W. E. Baker, Melrose; Albert Fries, St. Nicholas.

GRAPES, FIGS AND KAKI.—W. S. Hart, Hawks Park; A. B. Harrington, Winter Haven; W. H. Mann, Mannville.

PINEAPPLES AND OTHER TROPICAL FRUITS.—C. T. McCarty, Ankona; Wm. P. Neeld, St. Petersburg; F. N. Price, Orlando.

ORNAMENTALS.—E. D. Putney, Avon Park; Mrs. S. C. Warner, Palatka; W. I. Ellsworth, Jessamine.

DAMAGE FROM COLD AND BEST METHODS OF PREVENTION.—H. B. Stevens, DeLand; E. S. Hubbard, Federal Point; E. O. Painter, DeLand.

NOMENCLATURE.—Prof. H. J. Webber, Washington, D. C.; Dr. L. Montgomery, Micanopy; F. D. Waite, Belleview.

FERTILIZERS AND IRRIGATION.—M. F. Robinson, Sanford; E. Bean, Jacksonville; Thomas E. Richards, Eden.

VEGETABLES.—H. G. Hastings, Interlachen; H. Fleming, Kissimmee; T. P. Drake, Yalaha.

STRAWBERRIES AND MISCELLANEOUS.—H. G. Fletcher, Gainesville; L. Cameron, Jacksonville; W. P. Tucker, Brooksville.

ENTOMOLOGY.—Prof. H. A. Gossard, Lake City; W. H. Jones, Orange Bend; B. H. Alden, DeLand.

MARKETING AND GOOD ROADS.—W. M. Bennett, Okahumpka; C. M. Griffing, Macclenny; Chas. L. Beers, Emporia.

FORESTRY.—Dr. George Kerr, Pierson; Prof. E. T. Cox, Albion; H. H. Harvey, Seffner.

---

## SPECIAL COMMITTEE.

TO ATTEND MEETING OF AMERICAN POMOLOGICAL SOCIETY.—Prof. H. J. Webber, Washington, D. C.; Rev. Lyman Phelps, Sanford; G. L. Taber, Glen St. Mary.

This Committee was also instructed to confer with Nomenclature Committee of American Pomological Society on the correct spelling of the word "Pomelo" and the advisability of the adoption of the name in place of "Grape Fruit."

# LIST OF MEMBERS, 1899.

## HONORARY.

Berckmans, P. J., Augusta, Ga.

Redmond, D., St. Nicholas.

## LIFE.

Allen, Wm. 90 White St., New York City.
Andrews, Clement W., John Crerar Library, Chicago, Ill.
Armstrong, L. H., St. Nicholas.
Francisco, Beltran, Monterey, N. L., Mexico.
Conner, W. E., 532 Madison Ave., New York City.
Cunliffi, L. H., Garden City, N. Y.
Francis, Jr., Chas., Interlachen, Fla.
Frink, A., Glen St. Mary, Fla.
Gaitskill, S. H., McIntosh.
Haden, Capt. John J., Cocoanut Grove.
Haldeman, W. N., Naples, Fla., and Louisville, Ky.
Harris, E. K., East Palatka.
Hart, W. S., Hawks Park.
Hastings, H. G., Interlachen.
Harvey, S. S., Quintette.
Healy, G. P., Jaffery.
Hempel, H. A., Gotha.
Herf, B. von, 93-99 Nassau St., New York City.
Leonard, Geo. W., Hastings.
Merritt, Dr. Jos. C., Orlando.
Milligan, Jno. W., Apopka, Fla., and Swissvale, Pa.
Painter, E. O., DeLand.
Painter, Mrs. E. O., DeLand.
Phelps, Lyman, Sanford.
Price, F. N., Orlando.
Richards, Thos. E., Eden.
Robinson, M. F., Sanford.
Rolfs, Prof. P. H., Lake City.
Smith, Chas. E., Bog Walk, Jamaica, W. I.
Stuart, Leon N., Montemorelos, N. L., Mexico.
Taber, Geo. L., Glen St. Mary.
Tiffin, H J., Courteney.
Wilson, Lorenzo A., Jacksonville.
Woodroffe, Alfred, Auckland, New Zealand.
Wyeth, J. H., Winter Park.

## ANNUAL.

Adams, Geo. W., Thonotosassa, Fla.
Adams, Mrs. Geo. W., Thonotosassa, Fla.
Alden, B. H., DeLand, Fla.
Alderman, A. D., Bartow, Fla.
Aldrich, A. J., Orlando, Fla.
Allen, Hugh C., Maitland, Fla.
Ambler, D. G., Jacksonville, Fla.
Amsden, E. W., Ormond, Fla.
Anderson, George, Belleair, Fla.
Anderson, Capt. H. E., Interlachen, Fla.
Andrews, J. D., Glen St. Mary, Fla.
Andrews, Mrs. K. A., Glen St. Mary, Fla.
Armstrong, Fred. S., Maude, Leesburg, Fla.
Atkinson, Miss Frances, Melrose, Fla.
Ashmead, Ch. H., Jacksonville, Fla.
Atwood, Abner, Pawtucket, R. I.
Babcock, Miss M. K., 29 Wabash Ave., Chicago, Ill.
Bacon, C. A., Ormond, Fla.
Bacon, Mrs. C. A., Ormond, Fla.
Baker, C. H., Grasmere, Fla.
Baker, W. E., Melrose, Fla.
Balcolm, Mrs. Luke, Paola, Fla.
Baldwin, F. G., Lake Maitland, Fla.
Barnard, M. T., Manteno, Ill.
Barnes, L. A., Orlando, Fla.
Barrett, Andrew, Narcoossee, Fla.

Bass, M. M., Glen St. Mary, Fla.
Bean, E., Jacksonville, Fla.
Beed, H. O., Ormond, Fla.
Beers, Chas. L. Emporia, Fla.
Beers, John J., Emporia, Fla.
Bell, J. D., Hawthorne, Fla.
Benedict, A., Daytona, Fla.
Bennett, A. C., Tangerine, Fla.
Bennett, W. M., Okahumpka, Fla.
Bernd, Peter, Bowling Green, Fla.
Bernd, Mrs. Peter, Bowling Green, Fla.
Bessey, W. A., Stuart, Fla.
Biely, H., Box 271, Orlando, Fla.
Bigelow, Mrs. Mary A., Tarpon Springs, Fla.
Bigelow, W. H., Tarpon Springs, Fla.
Blackman, Rev. E. V., Miami, Fla.
Blake, Ellis G., Lake Helen, Fla.
Blakeley, Wm. P., Ocoee, Fla.
Bradt, Benj. N., Huntington, Fla.
Bradt, Mrs. Benj. N., Huntington, Fla.
Brooker, Hy. Spencer, Ocoee, Fla.
Brown, C. H., Altamonte Springs, Fla.
Bulkley, Fred. E., Belleview, Fla.
Bumby, C. E., Orlando, Fla.
Bumby, Jos., Orlando, Fla.
Bunce, Chas. H., Belleair, Fla.
Burgwin, Mrs. H. P., Zellwood, Fla.
Burlingame, Mrs., Miami, Fla.
Burr, Lafayette, Box 2235, Boston, Mass.
Butler, Wm. O., Orlando, Fla.
Caldwell, D. J., Higley, Fla.
Cameron, L., Jacksonville, Fla.
Campbell, W. B., Crescent City, Fla.
Cannon, W. C., Orange City, Fla.
Cary-Elwes, D G., Orlando, Fla.
Case, Mrs. Ida S., Port Orange, Fla.
Chamberlain, E. W., Tangerine, Fla.
Chapman, J. T., Plymouth, Fla.
Chilton, B. F., New Smyrna, Fla.
Chipman, John, Huntington, Fla.
Cliff, Walter, Crescent City, Fla.
Cline, G. A., 820 Lincoln Ave., Toledo, O.
Clow, W. S., Peru, Ill.
Coachman, E. H., Belleair, Fla.
Coleman, E. R., Glen St. Mary, Fla.
Copeland, R. E., Glen St. Mary, Fla.
Corell, A. Miami, Fla.
Corell, Mrs. A., Miami, Fla.
Corrigan, Dr. Joseph F., St. Leo, Fla.
Corry, W. M., Quincy, Fla.
Corry, Mrs. W. M., Quincy, Fla.
Condry, P. W., Citra, Fla.
Cox, Prof. E. T., Albion, Fla.
Cox, L. C., Orlando, Fla.
Crane, A. H., Nashua, Fla.
Crosby, J. A., San Mateo, Fla.
Curtis, Dr. John B., Orange Heights, Fla.
Daugherty, Jesse, Spring Garden, Fla.
Davenport, B. F., Chicago, Ill.
Davis, Clara Owen, Leesburg, Fla.
Delouest, Ed., Ocala, Fla.
Devenish, Robert J., California, Ohio.
Dole, Mrs. I. B., Manteno, Ill.
Dommerich, L. F., Maitland, Fla.
Drake, T. P., Yalaha, Fla.
Dusenberry, D. E., Lake Como, Fla.
Eacott, C. P., Miami, Fla.
Eldridge, Mrs. J. J., Belleair, Fla.
Ellsworth, W. J., Jessamine, Fla.
Enloe, Gillespie, Box 182, Miami, Fla.
Everton, Chas., Avon Park, Fla.
Fabyan, John, Conant, Fla.
Fairbanks, Geo. R., Fernandina, Fla.
Fairchild, H. C., 319 W. Duval St., Jacksonville, Fla.
Farley, J. F., Malabar, Fla.
Felt, J. P., Emporia, Fla.
Fleming, H., Kissimmee, Fla.
Fletcher, H. G., Gainesville, Fla.
Fletcher, Mrs. Nellie, Gainesville, Fla.
Forkert, C., Ocean Springs, Miss.
Frey, John, Bonaventure, Fla.
Friedlander, H., Interlachen, Fla.
Fries, Albert, St. Nicholas, Fla.
Gaines, J. B., Leesburg, Fla.
Gale, L. H., Jacksonville, Fla.
Gates, Benjamin, Narcoossee, Fla.
Gebhart, Jas. A., Auburndale, Fla.
Gebhart, Mrs. Laura, Union Stock Yards, Baltimore, Md., and care W. A. Gebhart, Auburndale, Fla.
Gillett, Egbert, Narcoossee, Fla.
Goodbody, A. G., 1020 7th St., Louisville, Ky.
Gore, Mahlon, Orlando, Fla.
Gossard, Prof. H. A., Lake City, Fla.
Gouet, E. H., Jacksonville, Fla.
Gould, Henry M., Glen St. Mary, Fla.
Gould, Mrs. Henry M., Glen St. Mary, Fla.

Gould, P. L., Eustis, Fla.
Gowen, C. S., Crescent City, Fla.
Granger, Wm. S., 211 South Canal St. Chicago, Ill.
Granger, Mrs. Wm. S., 211 South Canal St., Chicago, Ill.
Grant, J. B., Verona, Fla.
Graves, H. C., Alachua, Fla.
Graves, H. S., Gainesville, Fla.
Gregg, Rev. Dr. Frank M., Chicago, Ill.
Griffing, A. M., Macclenny, Fla.
Griffing, C. M., Macclenny, Fla.
Griffing, W. D., Macclenny, Fla.
Griffing, Mrs. W. D., Macclenny, Fla.
Gurney, L. H., Merritt, Fla.
Haden, Mrs. F. P., Cocoanut Grove, Fla.
Hall, Mrs. B. G., Jacksonville, Fla.
Hampton, B. M., Lakemont, Fla.
Hampton, Henry J., El Dorado, Fla.
Hargreave, George, Dunnellon, Fla.
Harrington, A. B., Winter Haven, Fla.
Harrison, T. F., Citra, Fla.
Harvey, H. H., Seffner, Fla.
Harvey, J. W., Glen St. Mary, Fla.
Haskell, W. H., DeLand, Fla.
Hastings, G. W., Interlachen, Fla.
Hastings, Dr. H. A., Huntington, Fla.
Haynes, A. C., DeLand, Fla.
Hayward, E. H., DeLand, Fla.
Healy, W. B., Jaffery, Fla.
Hepburn, H. S., Davenport, Ia.
Higgins, J. W., 38 Willow St., Providence, R. I.
Hilbourne, P. O., 58 Bedford St., Boston, Mass.
Hine, D. N., Nashua, Fla.
Hinks, Thos. V., Satsuma Heights, Fla.
Hopsen, Robert L., Bowling Green, Fla.
Hubbard, E. S., Federal Point, Fla.
Hubbard, Mrs. H. G., 260 Vinewood Ave., Detroit, Mich.
Huggins, J. N., 231 Arrow St., Marshall, Mo.
Ingraham, J. E., St. Augustine, Fla.
Irwin, Allen, Riverview, Fla.
Inman, F. W., Winter Haven, Fla.
Jackson, W. T., Gainesville Fla.
Jackson, Mrs. W. T., Gainesville, Fla.
Johnson, Edward, Quincy, Fla.
Johnson, E. W., East Palatka, Fla.
Johnson, J. H., Ormond, Fla.
Johnson, M. A., Box 216, Palatka, Fla.
Johnson, T. H., Apopka, Fla.
Jones, Cyrus, Bowling Green, Fla.
Jones, C. J. K., 315 South Broadway, Los Angeles, Cal.
Jones, W. H., Orange Bend, Fla.
Jouet, E. H., Jacksonville, Fla.
Keck, Irving, Bowling Green, Fla.
Kerr, Mrs. Carrie Lincoln, Pierson, Fla.
Kerr, George, M. D., Lavallette, N. J.
King, J. B., Braidentown, Fla.
Kinney, G. Park, Pierson, Fla.
Kinney, R. P., Pierson, Fla.
Klemm, Richard, Winter Haven, Fla.
Knox, L. B., Ormond, Fla.
Kolket, W. W., 202 Walnut Place, Philadelphia, Pa.
Kraemer, John F., Station A., Niagara Falls, N. Y.
Landsberger, Rev. R., Jacksonville, Fla.
Lauramore, W. H., Glen St. Mary, Fla.
Lees, J. W., Leesburg, Fla.
Leonard, Mrs. E. J., Hastings, Fla.
Leovy, Henry J., Box 1294, New Orleans, La.
Lewis, W. J., Mango, Fla.
Lindsay, J. E., Davenport, Ia.
Lloyd, Mrs. Frances, Orlando, Fla.
Long, W. H. D., M. D., Emporia. Fla.
Lowell, D. E., Lane Park, Fla.
Love, Ozro T., Bayonne, N. J.
Luttichau, H. von, Earleton, Fla.
Lyle, Wm., Bartow, Fla.
Lyman, Dr. A. E., Melbourne, Fla.
Lyman, F. W., Georgiana, Fla.
McBride, W. H., Seville, Fla.
McCarty, C. T., Ankona, Fla.
McCarty, Mrs. C. T., Ankona, Fla.
McClees, Mrs. H. A., Ormond, Fla.
McClees, Miss Victorine, Ormond, Fla.
McGraw, B. F., Buffalo Bluff, Fla.
Mace, J. P., Lake Helen, Fla.
Mann, W. H., Mannville, Fla.
Mann, Mrs. W. H., Mannville, Fla.
Margary, H. W. O., Eustis, Fla.
Markley, H. C., Clearwater, Fla.
Marshall, Geo. W., Interlachen, Fla
Mathenv, Geo. H., Sarasota, Fla.
Mead, Wm. Frank, Pierson, Fla.
Meislahn, H., Clarcona, Fla.

Meislahn, Miss Marie M., Clarcona, Fla.
Miller, L. B., Lady Lake, Fla.
Milton, T. N., Olustee, Fla.
Miner, Miss F. Mae, Emporia, Fla.
Miner, Martin, Emporia, Fla.
Miner, Mrs. Mollie A., Emporia, Fla.
Mitchell, A. J., Jacksonville, Fla.
Mitchell, John F., Lake City, Fla.
Montgomery, Dr. L., Micanopy, Fla.
Montgomery, Mrs. L., Micanopy, Fla.
Moran, Dr. M. C., 231 Milwaukee Ave., Chicago, Ill.
Moremen, M. S., Switzerland, Fla.
Moremen, Reginald T., Switzerland, Fla.
Morrish, C. M., Anclote, Fla.
Morrison, J. R., Pomona, Fla.
Mote, E. H., Oroville, Cal.
Munson F. W., Georgiana, Fla.
Neeld, Wm. P., St. Petersburg, Fla.
Newton, C. M., Orlando, Fla.
Nordmann, Ferd., New Smyrna, Fla.
Noszky, H. V., Earleton, Fla.
Nye, F. M., Earleton, Fla.
Palen, Peter E., Haines City, Fla.
Patterson, R. H., Rockledge, Fla.
Peacock, W. H., Tarpon Springs, Fla.
Perry, D. W., Pomona, Fla.
Pettigrew, A. J., Manatee, Fla.
Pfeifer, Fred., Ocala, Fla.
Phillips, J. H., Melbourne, Fla.
Pierce, H. W., Tangerine, Fla.
Porcher, E. P., Cocoa, Fla.
Post, C. C., Sea Breeze, Fla.
Powers, S., Jacksonville, Fla.
Prevatt, A. B., Seville, Fla.
Prevatt, Mrs. A. B., Seville, Fla.
Pratt, Dr. E. E., Limona, Fla.
Putney, E. D., Avon Park, Fla.
Pybus, G. E., Fruitland Park, Fla.
Reasoner, E. N., Oneco, Fla.
Remmers, B., DeLand, Fla.
Remmers, W. H., DeLand, Fla.
Rudisill, Roy, Bowling Green, Fla.
Runge, S., Gotha, Fla.
Russell, George I., Orlando, Fla.
Sampson, F. G., Boardman, Fla.
Sartorius, L. G., Seminole, Fla.
Schmelz, Victor, Sylvan Lake, Fla.
Sellmer, Chas., Zellwood, Fla.
Sheldon, W. D., Lake Helen, Fla.
Shooter, C. C., Waldo, Fla.
Shooter, H., Waldo Fla.
Sjostrom, L. H. O., Hallendale, Fla.
Smeltz, Henry A., Tarpon Springs, Fla.
Smith, Dr. C. H., Arcadia, Fla.
Smith, E. M., Winter Garden, Fla.
Smith, Walter A., Orlando, Fla.
Souvielle, Mrs. M., Jacksonville, Fla.
Sperry, E. F., Orlando, Fla.
Stebbins, L. D., Orlando, Fla.
Steinman, John D., Villa City, Fla.
Sternberg, A. O., Gainesville, Fla.
Stevens, A. B., Orlando, Fla.
Stevens, H. B., Citra, Fla.
Steves, Oliver P., St. Augustine, Fla.
Stewart, H. H., Ormond, Fla.
Stockbridge, Prof. H. E., Lake City, Fla.
Strout, H. T., Fruitland Park, Fla.
Strunk, W. P., Box 401, Roodhouse, Ill.
Taber, Mrs. G. L., Glen St. Mary, Fla.
Taylor, Wm. D., Ocala, Fla.
Taylor, W. H., Glen St. Mary, Fla.
Taylor, W. S., D. D. S., DeLand, Fla.
Thompson, Alexander, Miami, Fla.
Thompson, John, Clearwater, Fla.
Thompson, Miss Madge, Miami, Fla.
Thornton, C. B., Orlando, Fla.
Tiernay, J. I., Miami, Fla.
Townsend, W. C., Melrose, Fla.
True, J. L., Orange City, Fla.
Tucker, W. P., Box 56, Brooksville, Fla.
Turner, J. T., Clermont, Fla.
Tuthill, A. C., Brandon, Fla.
Tysen, C. R., Jacksonville, Fla.
Tysen, J. R., Jacksonville, Fla.
Van Houten, C. S., Orlando, Fla.
Varn, W. B., Bartow, Fla.
Van Roe, Jay, Tampa, Fla.
Waite, F. D., Belleview, Fla.
Wakelin, Amos, Bullitt Building, Philadelphia, Pa.
Walker, Dr. George, Huntington, Fla.
Wall, R. L., Jr., Interlachen, Fla.
Ward, G. H., Crescent City, Fla.
Warner, S. C., Palatka, Fla.
Warner, Mrs. S. C., Palatka, Fla.
Wartmann, E. L., Citra, Fla.
Watters, W., M. D., Lynn, Mass.
Webber, Prof. H. J., Washington, D. C.
Weiland, Chas., 316 3rd Ave., New York City.
Westlake, J. Willis, Lake Helen, Fla.

White, J. B., Virginia, Nebraska.
White, J. M., Orange City, Fla.
Whittle, J. C., Largo, Fla.
Wilke, R M., Commerciale 326, Villina Panarama, Triest, Austria.
Wilson, Chas. G., Winter Haven, Fla.
Wilson, J. P., Inverness, Fla.
Wilson, Wm., Ocoee, Fla.
Wilson, J. I., Haines City, Fla.
Wilson, Geo. W., Jacksonville, Fla.
Woods, O. K., Stuart, Fla.
Worcester, C. H., Pomona, Fla.
Wright, Geo. H., Orlando, Fla.
Wyckoff, J. S., Citra, Fla.
Winston, C., Winter Haven, Fla.
Zim, L. W., Evaville, Fla.

357 members

## CONSTITUTION.

ARTICLE 1. This organization shall be known as THE FLORIDA STATE HORTICULTURAL SOCIETY and its object shall be the advancement of horticulture.

ART. 2. Any person may become a Member of the Society by subscribing to the Constitution, and paying one dollar. Any person may become a Life Member of the Society by subscribing to the Constitution and paying ten dollars.

ART. 3. Its Officers shall consist of a President, three Vice-Presidents, Secretary, Treasurer and Executive Committee of three, who shall be elected by a ballot at each annual meeting. After the first election, their term of office shall begin on the first day of January following their election.

ART. 4. The regular annual meeting of this Society shall be held on the second Tuesday in April, except when otherwise ordered by the Executive Committee.

ART. 5. The duties of the President, Vice-President, Secretary and Treasurer shall be such as usually devolve on those officers. The President, Secretary and Treasurer shall be *ex officio* advisory members of the Executive Committee.

ART. 6. The Executive Committee shall have authority to act for the Society between annual meetings.

ART. 7. Sec. 1. The Constitution may be amended by a vote of two-thirds of the members present.

ART. 7. Sec. 2. An amendment to the Constitution and By-Laws shall be proposed at one Annual Meeting and voted on at the next Annual Meeting unless unanimous consent is given to its immediate consideration.

## BY-LAWS.

1. The Society year shall be co-extensive with the calendar year, and the annual dues of Members shall be one dollar.

2. All bills authorized by the Society or its Executive Committee, for its legitimate expenses shall be paid by the Secretary's draft on the Treasurer, O. K.'d by the President.

3. The meetings of the Society shall be devoted only to Horticultural topics from scientific and practical standpoints, and the Presiding Officer shall rule out of order all motions, resolutions and discussions tending to commit the Society to partisan politics or mercantile ventures.

## Proceedings of the Twelfth Annual Meeting

OF THE

# Florida State Horticultural Society.

The twelfth annual meeting of the Florida State Horticultural Society was held at Jacksonville upon the invitation of the Board of Trade of that city. The Society convened in the rooms of the Board of Trade on Tuesday, May 2nd, 1899, at 7:30 o'clock p. m., in accordance with the programme, as published, and adjourned sine die on Friday following, at 12 o'clock m. About 175 members were in attendance, and the meeting was instructive and enjoyable.

## MINUTES.

In the minutes, which follow, all the events and transactions of the meeting are given, in condensed form, in the order of their occurrence; the addresses, papers, discussions, reports and other matters of general interest or special importance, are simply noted and appear in full under appropriate heads in the body of the volume, and may be readily referred to by turning to the page given in connection with each below.

For addresses of members (which are not given below) see "List of Members."

### FIRST DAY.

EVENING—OPENING SESSION.

Tuesday, 7:30 o'clock p. m.

1. Call to order by President Taber.

2. Prayer, Rev. W. H. Dodge, of the Newnan Street Presbyterian church.

3. Address of Welcome, Hon. R. D. Knight, Mayor of Jacksonville; also by Capt. C. E. Garner, President of the Board of Trade. (See page 6.)

4. Response to Address of Welcome, C. A. Bacon. (See "Response to the Address of Welcome," page 9.)

5. On motion, W. S. Hart and H. G. Hastings were authorized to act as assistants to the Secretary.

6. President Taber's annual address. (See page 10.)

7. Executive Committee's, Secretary's and Treasurer's annual reports postponed.

8. Report of Special Committee on Local Arrangements was made by Hon. Geo. W. Wilson, chairman.

9. The Committee on Damage From Cold not being wholly ready, an impromptu discussion was had on the same topic. (See page 16.)

10. Defense of the Weather Bureau by Director Mitchell.

## SECOND DAY.

### MORNING SESSION.

11. Discussion of Cold and Protection of Trees continued. (See "Protection of Trees," page 33.)

12. Root Pruning as a Protection Against Cold. (See page 36.)

13. Paper, "Range of Temperature; Its History and Effects," read by Major George R. Fairbanks. (See page 37.)

14. On motion permission was granted to Mr. Fred. Pfeifer, the delegate appointed by the Governor to represent Florida at the Greater America Exposition at Omaha, to address the Society.

15. Discussion on Spraying With Water as a Protection Against Cold. (See page 40.)

16. A paper was read by C. A. Bacon on Shedding Trees. (See page 51.)

17. Announcement was made by President Taber of the meeting of the Good Roads Association.

18. On motion of C .A. Bacon a committee of three was appointed to nominate officers to be elected by the Society. This committee was itself nominated by various members of the Society in succession, and B. N. Bradt, H. G. Hastings and E. S. Hubbard were chosen.

19. Report of the Standing Committee on Danger from Cold and Best Methods of Protection read by the chairman, Prof. H. E. Stockbridge. (See page 19.)

### AFTERNOON SESSION.

Wednesday 2:30 p. m.

20. A letter of regret from Geo. H. Wright was read by the President.

21. On motion of Prof. H. A. Gossard a committee of five was appointed by the President to devise needed legislation to prevent the introduction and spread of insect pests and plant diseases and to recommend the enactment of the same to the Legislature. Prof. H. A. Gossard, Prof. P. H. Rolfs, E. O. Painter, H. L. Wartman and M. S. Moremen were appointed.

22. A voluntary contribution entitled "Minimum Temperatures of Florida Winters Since 1833," illustrated with a chart, was read by Director A. J. Mitchell, of the U. S. Weather Bureau. (See page 42.)

23. Discussion of same.

24. The report of the Standing Committee on Citrus Fruits was read in the form of three papers, one by H. B. Stevens; one by J. J. Beers; one by Irving Keck. (See pages 47, 49 and 50.)

25. Discussion of the above.

26. General discussion on Effect of Sheds and Shading. (See page 54.)

27. Discussion on Grafting vs. Budding. (See page 104.)

28. Fruit from Inside and Outside of Tree—a discussion. (See page 55.)

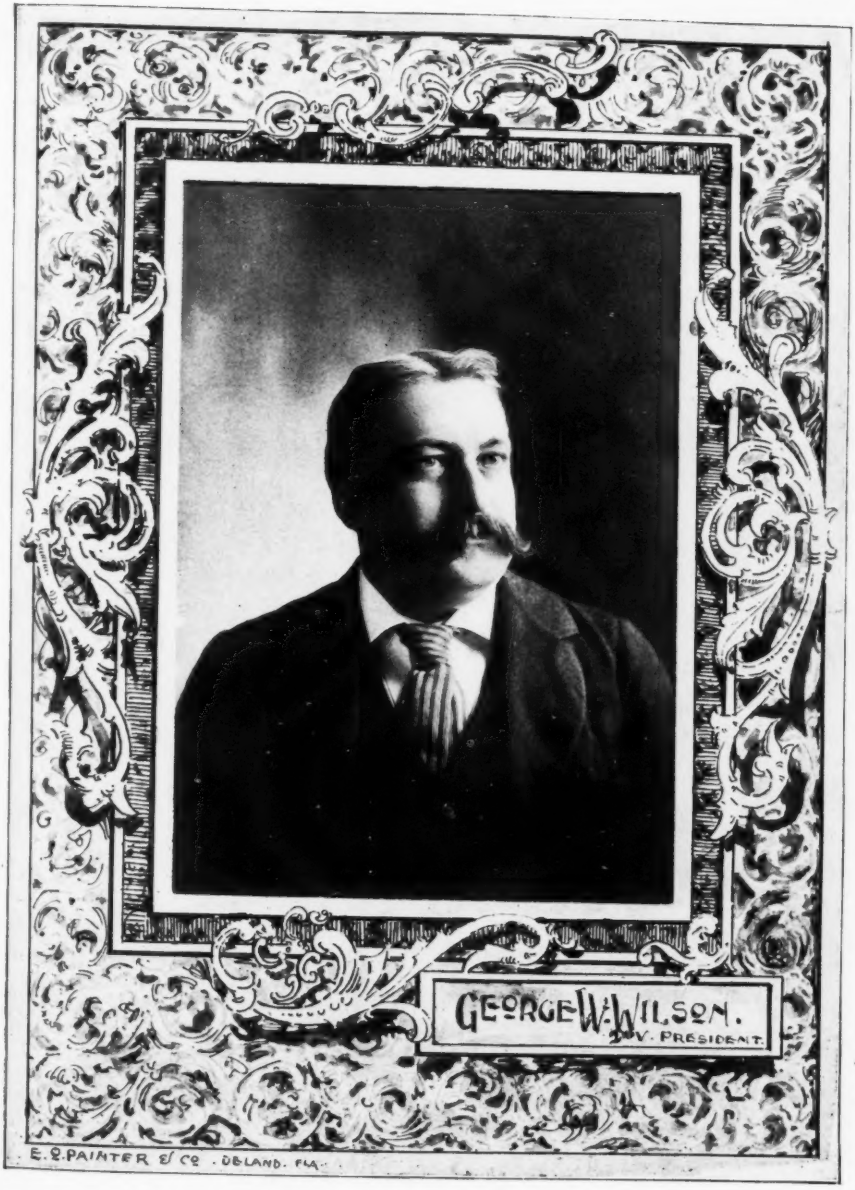
29. Other Protecting Devices—a discussion. (See page 56.)

30. Report of Standing Committee on Diseases and Insects of the Citrus, read by E. S. Hubbard, chairman. (See page 59.)

31. Committee on Froscher Remedy for Dieback. No report.

### WEDNESDAY EVENING.

32. Instead of a session the members attended a free dramatic entertainment, "What Shall We Do With Her?" given by


GEORGE W. WILSON.
V. PRESIDENT.
E. O. PAINTER & CO. DELAND. FLA.

Jacksonville home talent, complimentary to the Society.

## THIRD DAY.

### MORNING SESSION.

Thursday, 9 a. m.

33. Committee on Final Resolutions appointed.

34. Letter read from American Pomological Society and a committee of three, President Taber, Rev. Lyman Phelps, and Professor H. J. Webber, appointed to attend their meeting in September.

35. Professor Webber gave a voluntary contribution, a paper entitled "Some Characteristics of Citrus Hybrids," illustrated with a number of photographs. [See page 62.]

36. Discussion of above.

37. H. B. Stevens stated that the railroads had offered to give a reduced rate on lumber hauled by them for the purpose of building orange sheds.

38. Report of Standing Committee on Entomology, by Professor H. A. Gossard, chairman. (See page 65.)

39. Discussion of same.

40. Major Geo. R. Fairbanks, chairman of the Standing Committee on Nomenclature, stated that the committee did not consider any report necessary.

41. Standing committee on Pineapples called. No report.

42. Report of standing committee on Peaches and Plums, by C. C. Shooter and B. M. Hampton, was read by H. G. Hastings. (See pages 71 and 72.)

43. A paper on Matting for Tree Protectors, by H. Meislahn, was read by the President.

44. Report of the Standing Committee on vegetables, by J. B. King, was read by W. S. Hart. (See page 74.)

45. Discussion of above.

46. Discussion on Cassava Culture. (See page 75.)

### AFTERNOON SESSION.

Thursday, 2:15 p. m.

47. Report of the Special Committee on Insect Pest Legislation, and draft of proposed bill submitted. (See page 78.)

48. Discussion of above.

49. Resolution offered by H. L. Wartman, urging each member to write to his representative in the Legislature, requesting him to work for horticultural quarantine measures. Adopted.

50. Resolution by Dr. Geo. Kerr, congratulating H. M. Flagler on his expressed intention to become a citizen of Florida. (See "Special Resolutions," page 116.)

51. Report of Secretary H. G. Hastings, up to Jan. 1, 1899. (See page 109.)

52. Election of Officers. (See page 113.)

53. Debate on next place of meeting. Jacksonville selected. (See page 114.)

54. Resolution offered by B. N. Bradt, declaring the strong opposition of the Society to a bill offered in the Legislature, proposing to consolidate all the State educational institutions and divide up the Morrill and Hatch funds among them all. Adopted.

55. Standing Committee on Strawberries and Miscellaneous Fruits. No report.

56. Discussion on the topic. (See page 82.)

57. Remarks on Canes and Umbrella Handles by V. Schmelz. (See page 82.)

58. Renewed discussion on Cassava. (See page 76.)

59. Standing Committee on Figs and Kaki called. No report.

60. Discussion on these fruits. (See page 83.)

61. Standing Committee on Grapes. Report presented by the Chairman, Dr. E. E. Pratt. (See page 84.)

62. Remarks on Cross-Breeding, by Prof. Webber. (See page 85.)

63. Annual Report of Executive Committee, read by E. S. Hubbard.

66. A Report on Tropical Fruits by Mrs. Florence P. Haden, a member of the Standing Committee, was read by the Secretary. (See page 106.)

65. Discussion on same.

EVENING SESSION.

7 o'clock p. m.

66. The Society listened with profit and pleasure to an address by Prof. H. Rolfs, on the Effects of Different Fertilizers on Pineapple Plants, copiously illustrated with stereopticon views. (See page 90.)

67. The remainder of the evening was given to a collation, with toasts and speech-making, which had been tendered by the Board of Trade and their wives and daughters as a special compliment to the S
(See report of "Local Committee," page 15.)

## FOURTH DAY.

MORNING SESSION.

Friday 9 a. m.

68. Report of Treasurer, W. S. Hart (See page 112.)

69. Report of Secretary, S. Powers. (See page 109.)

70. Report of Committee on Final Resolutions. (See page 117.)

71. Resolution by W. P. Neeld in favor of Good Roads. Adopted.

72. Resolution offered by B. N. Bradt, instructing the Executive Committee to consider the propriety of appointing a Standing Committee on Good Roads Adopted. (See page 117.)

73. Standing Committee on Ornamentals. Report by E. N. Reasoner, Chairman, read by the Secretary. (See page 87.)

74. Discussion on above.

75. A volunteer paper on Melon Culture, by C. H. Baker, read by the Secretary. (See page 108.)

76. Standing Committee on Marketing called. No report.

77. Remarks by E. D. Putney, Rev. I. man Phelps, Dr Geo. Kerr, C. A. Bacon, and others. (See page 96.)

78. Discussion on the orthography of "Pomelo," and the use of the word instead of "Grape Fruit." It was finally voted to let the entire matter go over until next year, in charge of a committee, appointed for that purpose.

99. Standing Committee on Fertilizers called. No report.

80. Standing Committee on Irrigation called. No report. (Proc. p. 94.)

81. Discussion on Irrigation as a Way of Inducing Dormancy in Orange Trees and Consequent Immunity From Cold.

82. Report on the Economy of Trees, by C. A. Bacon, Chairman of Standing Committee on Forestry. (See page 100.)

83. President Taber read a telegram from H. M. Flagler, of New York.

84. F. Pfeifer, the delegate appointed by the Governor to represent Florida at the Omaha Exposition, addressed the Society, urging some official action in support of the effort to have the State represented. A discusison of some length occurred. Director Mitchell, C. A. Bacon, W. S. Hart, E. D. Putney and others expressed a will-

ingness to send individual contributions. Rev. Lyman Phelps expressed doubts as to the ability of the great Citrus and Pineapple Industries, under present circumstances, to make a creditable exhibit this year. A rising vote was taken in favor of a Florida exhibit being made, each member to contribute something.

85. The Secretary was instructed to prepare a memorial page in commemoration of the two members deceased the past year.

86. Adjourned sine die, 11:30 a. m.

# ADDRESS OF WELCOME.

HON. R. D. KNIGHT, MAYOR OF JACKSONVILLE.

[See monutes, pages 1 to 5; item 3.]

Mr. President, Ladies and Gentlemen—Jacksonville extends to you today a hearty and cordial welcome, and she does it not simply because of her innate hospitality which extends a welcome to all strangers within her gates, but also because she feels she owes to you a debt of gratitude. The city is built upon that which comes to her from the country; eliminate the country and the city dies; eliminate the city and the country will still continue to live, though perhaps lacking in some of its luxuries. But it can and will live without the existence of any city. In our modern civilization, however, we have become mutually dependent the one upon the other, and we have come to regard as being necessary for our existence things of which our forefathers knew nothing. The city is simply a great clearing-house for the country. The guns are useless without the ammunition, which, after all, gives to the guns their power. These great thirteen-inch guns of the Oregon could not have spoken with such power and effectiveness against Cervera's fleet, had it not been for that which the shells supplied. They are magnificent to look upon and they fill us with awe and amazement, but how useless are they without the insignificant shell.

Resolved then to its last analysis, we say that the strength and effectiveness of any city are based upon the character of the ammunition furnished from the country, plus the men who guide and direct her. This ammunition cannot be produced within the corporate limits of a city, though a Pingree might attempt it in a limited degree. It requires breadth of earth which the city in its confined condition cannot furnish. It requires freshness of air and sunshine, and these disappear where brick walls are reared. It requires a race of sturdy, steadfast and observant men, and these are not produced where the man looks out upon the same aspect from morn till eve, and where he passes the same pile of bricks each day on his way to his labor.

Gentlemen, we of the city furnish the guns but we recognize how useless they are without the ammunition which you supply. And so it is we watch with feverish anxiety the weather and calculate what effects it may have upon the man in the country. This anxiety on our part is not an unselfish one. We know that the prosperity of our city depends upon your prosperity. We base all our calculations upon the man upon whom we know we can depend so long as there comes no providential interference.

And so when there came sweeping across

our State the cold blasts from the North. our hearts sunk within us. We knew that your injury was our injury. We knew that naught could touch the delicate chord of your success without its sound reverberating down our streets. Failures of crops produce stagnation and depression in the cities. Abundant crops set the wheels of prosperity to spinning and swell the accounts of our merchants.

Today you look around you, my friends, and you see a city of which we are proud. It is the reflex result of your labors that you see presented here in our fine buildings and well paved streets. The city is yours because you have produced it. We simply live here on your sufferance. We are merely your agents managing its affairs. When you come in we lay down our authority and power as all derived power and authority is laid down in the presence of its source. We submit humbly and meekly. We acknowledge our subservience. We are grateful to you for permitting us to occupy so much as a room in your beautiful city. We turn over the keys to you and say to you "Enter into thine own;" and when you get through using it, we will, with your kind permission, take up again the burden of administering its affairs for you.

Then, hail and welcome. Hail with due acknowledgement of your power. Welcome with deep gratitude for enabling us to build so well upon your labors.

## ADDRESS OF WELCOME.

By Captain C. E. Garner, on Behalf of the Board of Trade.

[See minutes, pages 1 to 5; item 3.]

I desire to repeat the welcome extended by our worthy Mayor. In behalf of the city of Jacksonville and her business interests I desire to extend to you the most hearty welcome. We are glad to have you with us once more, and we trust we will have the same pleasure many times at your annual meetings in the future. History teaches us that some of the greatest achievements of this earth have been obtained by men banding themselves together for some definite purpose. It is an acknowledged fact that that industry which is of such vast importance, and which it is no exaggeration to say is of the highest interest to our country, has so few organizations for their benefit and advancement.

Thirty odd years ago the Grange movement was organized for the benefit of the agricultural interests of the farmers of this country. The first President of this Society was also one of the organizers of this great movement which spread over our country and became a vast organization. For nine years it prospered, and promised to be a useful organization for all time. Subsequently it was diverted from its agricultural purposes, and from internal causes of various kinds it fell into the hands of selfish men who used it for political purposes, from

which time its usefulness declined. The Farmers' Alliance followed the Grange movement, and from the same reasons failed to realize the expectations of its founders—as was also the case with the National Grange, Farmers' Benevolent Association. All other industries are thoroughly organized. We find organization and specialization in almost every industry. But we find the greatest of all industries unorganized. (Applause.) Look on the other hand. Transportation interests in our country were organized in 1867. They formed what is known as the Southern Railway and Steamship Association, embracing the country south of Ohio and east of the Mississippi river. It has carried out the intention of its founders—which is the same intention as other organizations of the same character—which have for their purpose the eliminating of competition and reducing it to a minimum.

The manufacturing industries of our country are thoroughly organized. They favor organization. Competition is greater among the commercial pursuits, and it is for the lessening of this competition that they are organized. Skilled laborers in all cities are organized to prevent competition. National organizations such as the Knights of Labor, American Federation of Labor, and Central Union of Laborers, covering almost every field of skilled labor, and even stevedores, all have the same purpose—that of eliminating all competition between members of their respective associations. Samuel Gompers, Powderly, Debs and all other labor leaders understand that the primary object is to regulate the price of labor and to limit the number of hours of labor. All the benefits that accrue to these organizations must necessarily fail with that class which is not organized. I hope to see our agricultural interests thoroughly organized. Stand together as other organizations stand together. It is quite a rare privilege to have such a splendid organization to entertain as we have tonight.

With agriculturists the conditions which prevail today are those which have always prevailed. Every man engaged in agricultural pursuits, every laborer in the field, competes with every other man similarly engaged in the same State, the adjoining State and in all nations of the world, and competition runs wide open and unrestricted as far as agriculture is concerned. It has resulted evilly on both sides. We find by statistics that our agricultural interests are depressed. We find that it is the tendency of the people who live in the country to come to the cities. This results in a congestion of the cities and the impoverishment of the country. I have frequently thought of the evils which exist chiefly owing to the fact that our agriculturists are not more generally and thoroughly organized, and it is a pleasure to represent the commercial interests of this city and welcome such a large and intelligent body of men as their Society. (Applause.)

# RESPONSE TO ADDRESS OF WELCOME.

C. A. BACON.

[See minutes, pages 1 to 5; item 4.]

The response of Mr. Bacon was brimful of wit and wisdom, and was thoroughly enjoyed. He is known as the humorist of the Society and his remarks fully sustained the reputation. He said in part:

"Mr. President, Ladies and Gentlemen—You all join me in a hearty return of thanks to the people of Jacksonville, the Board of Trade, and to his Honor, the Mayor, who has so eloquently conveyed to us a welcome to their city, and, Mr. President, after hearing the warm words of welcome from his Honor, falling on us like drops of rain on a thirsty soil, I am sure a mistake has been made, and that my words will produce the same effect as did the snow flakes that fell in your city last February. Did I hear some one say that subject is barred out? Florida is the big toe of Uncle Sam, and Jacksonville is the main artery. Every pulstation in all parts of the State is felt here. The bulk of the produce of this great State centers here. The citrus fruits, tomatoes, string beans, and strawberries pass through here on express trains, and the "silver sides" and oleomargarine slide back to the hungry Yankee-Cracker. There is but one Jacksonville, and all roads lead to it. A man in North Dakota tells his friend that he is going to Jacksonville next winter. Does the friend ask him where that is?

"We old farmer jays have come up here today to rub together, to mingle the sand with the hammock soil, talk it over, and face your merchants. Did one of your young merchants stop at the door a moment ago, and remark: 'What are those old farmers doing here, anyway?' Little knowing that some conclusion arrived at here will make or break his business. You cannot learn the age of a mule by tickling his hind legs with a brier, neither can you tell what a man is by the clothes he wears."

[The speaker then reviewed the three times when he had had a part in taking Jacksonville, the first being in 1862, when he aided in the capture of the empty fort at St. Johns Bluff and when yellow fever was captured with the nine guns. He spoke of a later visit to Jacksonville, in 1873, when the Yankee hotel keeper was in possession, and when all of Florida could be seen in a round trip from here to Sanford by steamer, and when the streets of Jacksonville were paved with porters, bellboys and hackdrivers. He contrasted it with the present visit, when swift moving trans landed the visitor in the city, with the electric transit, and the splendid monuments to industry that mark the city.]

"But, gentlemen, Florida about that time was preparing for a transition. Men were

coming to this State and city, the majority of whom were of a higher quality than ever entered a new State before—silent men, earnest men, and men of brains, and they scattered all over the State, cleared the rolling pine woods, subdued the tangled hammock, planted the seed that grows the tree that bears the golden apple of the Hesperides; made gardens of Eden; encouraged capital to come; raised Jacksonville from the sand; paved her streets and electrified her transit; built her water works, courthouse, armory, postoffice and hundreds of noble buildings, and the greatest of them all whose light shines over the whole State and land—the Times-Union and Citizen. They brought Flagler and Plant and Duval, who have laid ribs of steel the length of the State; built palaces for the wealthy pleasure seeker and invalid, and enabled us farmers, who once had to take the dirt road, to come here today, 100 miles for 100 cents. They brought Disston, who paid into the State treasury $1,000,000 and raised the State debt; brought Chipley, DeLand, Stetson, Borden, and hundreds of others who have invested their money. Are we not willing that they should receive 2½ per cent. for their money?

"And so we have come here to talk it over, and if possible, invent some way to thaw the snow before it falls. Uncle Sam of late has taken in so many tropical islands that he is obliged to crowd Florida further north; but in the words of Dickens, "the hill has not yet lifted its head to heaven that perseverance will not gain the summit at last." We have the indefatigable, honored and respected Webber and Swingle with us, and we bank on them, hoping through them in the near future to be able after shoveling away the snow bank to pick orange blossoms in February. Mr. President, in closing, let us again say to his Honor, the Mayor, the Board of Trade and the people of Jacksonville, we thank you."

## PRESIDENT'S ANNUAL ADDRESS.

GEORGE L. TABER.

[See minutes, pages 1 to 5; item 6.]

Members of the State Horticultural Society, Ladies and Gentlemen—A little over fifty-nine centuries ago the oldest calling known to man, and the one which we have met to consider in its later-day phases, had its beginning.

Inspired history informs us that the horticultural conditions that prevailed during a small portion of the early part of the most remote period of time on record were of a most pleasant character. Unfortunately these happy conditions were of short duration.

But, passing rapidly over the first half of these fifty-nine centuries of time that, according to Bible chronology, divide the most remote past from the present, we come to the time of King Solomon during

whose entire reign, we are told, the people "Dwelt safely, every man under his vine and under his fig tree."

Commentators also tell us, through the marginal notes that accompany the Inspired account, that the Hebrew word which is translated "safely" could with equal propriety be interpreted "confidently." In other words, there has been a time, within the history of mankind, when the happy horticulturist dwelt safely and confidently under his vine and under his fig tree for a period of forty years.

Not only has there been such a time, but, to those of us who have been casting about for data upon which to base periodicity in recurrent conditions, it may be interesting to learn that this happy forty-year-period commenced a little more than twenty-nine centuries after the still more ideal Adam-and-Eve period, and that twenty-nine centuries have also now elapsed between the beginning of the forty-year period of safety and confidence and the present time. I am sorry to have to state, however, that this reckoning, although correct as to centuries, shows a few odd years still ahead of us before happy horticultural conditions may again be expected to recur.

However much or little weight we may attach to this figuring in connection with forecasting the future, we are probably nearly or quite unanimous in the opinion that we are in a position to appreciate a recurrence of such long-continued favorable conditions.

We are inclined to envy the contentment and peace of mind of our long lost horticultural relatives of the Solomonic period who could, in safety and confidence, sit in the shade and muse on happy horticultural conditions extending not only through individual years but continuous decades, during which, we presume (for distance lends enchantment to time as well as space) the same vine and the same fig tree were freely bestowing upon him and his fellow horticulturists their annual output of luscious fruit. No anguillula at work on the fibrous roots of the fig and no fungus on its leaves. No anthracnose or mildew on the vine. No investigation necessary to the history of plant diseases or insects, or the pronunciation of their nightmare names. No Bordeaux mixture, kerosene emulsion, or rosin wash to make; no hydrocyanic acid gas to manufacture ; no spraying pump to buy. No analysis known or needed of the constituent parts of commercial fertilizers nor tabulated statements to study as to their individual or combined effects. No knowledge and hence no fear of white fly, mal-de-goma, blight, dieback, curculio or scale insects. No state or national legislation necessary for confining insect pests to localities already preempted, and no relief-giving parasitic importations called for to prey upon insects that, presumably, did not exist.

Oh! Long lost horticultural brother of by-gone ages if we might call your spirit back and have you address our Society on the horticulture of your day and you, in turn, listen to our exposition of a horticulturist's present day hardships, duties and equipments, we wonder who would be more astonished, you or we. If, however, you should waive the priority generally accorded to old age and an invited guest and ask that we address our evidence first, and we should go into detail of the things alluded to; refer to ravages from frost and fire and drouth and flood; inform you of the vast amount of horticultural investigation and experimentation being carried on by eminent professors working through a bureau of our national government supported by

the people; you would, we imagine, listen with constantly increasing wonderment and finally, without vouchsafing a word as to the horticultural conditions as you knew them, ask to be retired to the spirit world from which you had emerged.

I trust I shall not be accused of sacrilege in dealing with Bible characters or of irreverence in calling up the shade of one so long departed in order to emphasize the seeming contrast between conditions past and present. As a matter of fact we know very little about the then existent horticultural conditions, and even the inspired account does not state that the vines and figs under which these good people dwelt for forty years were continuously fruitful during that time and always free from insects. The fact does, however, seem to be fairly well established that during that period they were never even partially frozen out.

Not only do I hope that I shall not be accused of sacrilege or irreverence, but I also trust that I shall not be considered an alarmist and overrating the difficulties which, as horticulturists, beset us.

The tiller of the soil, be he horticulturist or agriculturist, has in every age and in every clime had difficulties and drawbacks to contend with, but tell me, if you will, of any calling or any profession upon which a man may embark with absolute assurance of riding safely into port without ever encountering a head wind or an unruly wave.

In our calling, as in every other, there have been and will continue to be both failures and successes, and in our calling, as in every other, the man who properly estimates the difficulties to be encountered and then steadfastly pursues a conservative, well defined prearranged plan of action, yet holding himself in readiness to meet emergencies as they arise, is he who can, with the greatest degree of confidence, expect success.

The day is past when half-hearted or haphazard methods may be expected to produce a rich harvest. The civilization of today is, in every calling, one of active and strenuous endeavor. And, whatever comparison we may choose to make between the prospects for the future and those that have existed in the past, the results are, at all events, likely to prove disappointing to him who lays stress and acts on the maxim that "the practices of his forefathers are good enough for him."

While I would not seem to overrate the difficulties that we have to meet, neither would I underrate them, for I believe that he is no true friend of the horticulturist who would have us believe there is either time or land in sight where roses will bloom uncared for the year round without ever developing so much as a single thorn.

To be sure, some of us who were born in a more northern clime can look back, to these many years, and remember how the old apple trees, under which we played, bore, as it then seemed to us, a hundred bushels apiece, and how the trees were always healthy, without any off years, and the apples all extremely large, highly colored, rich and juicy and either sweet or just mildly sub-acid, with seldom a worm (that we noticed) and often not even a core. But such reminiscences, students of human nature tell us, are apt to come with grey hairs and are not to be counted upon for scientific accuracy. Besides, we have a horrible indistinct nightmare sort of a remembrance, which we never mention, and which, from being relegated to the background of our memory for so long, has become elusive,

that later on these trees had off years and were infested with canker worms, and that apples were reputed to have been taken from them that were small in size, off in color and actually sour. And still later on some of us have, perhaps, visited these old homesteads in person and found the trees themselves (although never frozen back) only about one-third as large as we first knew them. This we demonstrated to our entire satisfaction by the simple test that we had somewhere seen recommended of encircling them with our arms. We found that we could now easily clasp our hands on the other side, although when we first knew them such a feat was impossible.

Comparisons of the horticultural conditions of today with those of the past are apt to be fallacious unless we have absolutely undisputable data upon which to work, and in this direction the present day research, experiments and rapidly accruing results are of such magnificent proportions as to almost astonish ourselves. They are of vast import not only to ourselves but to those who will come after us. It is not only in our own state, but in every state, that horticultural knowledge is being eagerly sought and advanced methods of meeting local conditions established.

And in this connection there is one thing it seems to me we are apt to lose sight of, and that is that we are building for posterity as well as ourselves, and not only that, but building faster than we know. We have only to look back a quarter of a century and note what giant strides have been made within that time. As horticulturists our progress may seem to us slow, but that is only in comparison with the heat of the race as applied to every calling and profession.

Thirty, twenty or perhaps only ten years hence such of us as are then living, together with the newer members of whom this society will by that time be largely composed, will, in all likelihood, look back and wonder why we of the present time did not occupy a more advanced position in relation to certain phases of horticulture. But, let us remember that it is what we are doing today and in the intervening time that is going to make their standpoint of retrospect available.

In our efforts towards horticultural progress it is not only necessary that we should be actively engaged in studying newer horticultural phases in the light of later knowledge but it is equally necessary that we frequently review the lessons already learned; for one lesson well stamped upon our memory is worth a much larger number that have been skimmed over without leaving an impression. And one of these lessons, which the most of us have learned but which the most of us may perhaps review with profit, is illustrated by a comparison of the methods now prevailing in the treatment of some fruit trees with those in vogue some years ago. Instead of the long bodied, slim trees that were by many considered a very proper tree to plant in years gone by, the tendency is now constantly increasing toward low branched stocky ones. Instead of the barbarous custom, practiced by some, under the name of horticulture, in a civilized country, of assiduously rubbing off all shoots that put in an appearance for three, four, five or even six feet up the stem, we now find the trees more generally encouraged to branch at or near the ground and allowed to form the low, dense spreading tops that nature intended them to have for their own protection. If any of us are inclined to advance the proposition that the heavy freezes of recent years are largely

responsible for this change in the form of tree desired, this, after all, is but begging the question and is merely equivalent to saying the freezes have taught us a lesson that we should have learned without them. For, not only is a low branched stocky tree more resistant to cold but, if grown in a locality that is exempt from frost (if we know where that is) it, in that case, needs all the shade that can be given it by its own branches to protect body and roots from too fervent and long continued heat.

Again, in the matter of banking our trees we see exemplified that fact already alluded to that lessons supposed to have been learned will bear reviewing, for having learned in comparatively recent years the great protection from cold afforded the trees by simply banking the earth high around them in the fall, many of us have not practiced it to the extent we should have done and have thereby suffered loss.

And, still again, in this matter of banking we see demonstrated how seemingly changed conditions will draw upon our resources for meeting such conditions; how the barely evolved and even discredited theory of today may become the demonstratedly valuable practice of tomorrow. For we do not have to look back many years to find that amongst many of the foremost orange growers of that day such a practice would have been deemed equivalent to horticultural suicide.

By referring to the report of the 1894 meeting of this society held in this very hall only five years ago we find that one of the topics of paramount importance at that time was how to market the vast crop of oranges "in sight" with any margin of profit. The opinion of many prominent growers then was that orange growing had already assumed top-heavy proportions. The freezes of the following winter supplemented by those that have since occurred have eliminated, for the present, and probably for some time to come, all thought of over-production, and the question today is not so much what to do with the fruit as how in "safety and confidence" to produce it.

Few great issues in our, or any other, calling are ever settled till we are brought face to face with the conditions that demand action; when these conditions present themselves then all the resources of which we are possessed are called into play to devise the best methods of meeting and overcoming them; it is then and not till then that we fully fathom the extent of our responsibilities. And, if the task before us seems an arduous one, and the conditions appear discouraging, we may at least draw comfort from the fact that the largest degree of success, in the true sense of the word, has been made by people who have had large obstacles to encounter and who have met and grappled with them like brave men and women.

There is but little of real worth in this world that does not have to be worked for and sometimes, as some of us have had demonstrated within the past few years, almost literally fought for. The successful horticulturist of today needs to be a thinker, a worker, and not infrequently a fighter. Please do not, however, construe this fighting requisite into any other than the horticultural sense in which it is used.

We have had horticultural aspects to consider in the past that were of different character from those that assume prominence today, and we may have still different ones confronting us in the future, but as each of them arises these different problems will be met on that broad basis of "Advancement in Horticulture" which is the

most prominent clause in this society's constitution.

I wish that I might have been able to congratulate you at this time on the absence of any havoc wrought by cold during the past winter, and that we might feel that we were fairly started on such a long continued period of "safety and confidence" as that alluded to earlier in this address.

The problem that is undoubtedly uppermost in our minds at this time is the same one which confronted us a year ago; for I feel sure that a large proportion of us are more interested in any practical method of protecting our groves than in any other one thing that can possibly demand our attention.

In my address of one year ago I recommended that a standing committee be appointed on "Damage from Cold and the Best Methods of Prevention." In this you concurred and such a committee was appointed. The reports of this, and other able committees, together with the wide range of discussion that will follow these reports, will undoubtedly prove of great value and be of far more service to you than any lengthy address that I might make. The problems ahead of us we shall meet, and try to solve, and I trust we may gain an advance step in the right direction. If, as is sometimes stated, experience is necessary for a proper appreciation of knowledge, the most of us have had, we think, sufficient experience to make a solid base for any superstructure of knowledge that we may hope to erect upon it. And in this connection I wish to state that it is not only our privilege that we may, but the unwritten law of this Society that we should, each of us add his mite of information toward the building up of the whole. No man in this Society can tell us all the things we stand in need to know, but probably each of us can contribute something. We are all anxious to learn and all, I trust, equally anxious to impart any information that will serve to accrue to our mutual benefit.

I greet you cordially and heartily and trust that the present meeting may prove of great benefit to ourselves and that we shall also leave on record something of value to the horticulturists of the future.

## REPORT OF SPECIAL COMMITTEE ON LOCAL ARRANGEMENTS.

The Report of the Special Committee on Local Arrangements Was Made by Geo. W. Wilson, Chairman.

[See minutes, pages 1 to 5; item 8.]

Mr. President: I have the honor to report that your committee, charged with making local arrangements for the convenience and entertainment of the Society, has completed its task, which I trust will be satisfactory to you.

I desire to say that we were met with a most hearty co-operation by the people of Jacksonville.

The Board of Trade kindly tendered the use of this room for the session. The Board has also provided a number of en-

tertainments which you will find upon the program.

This is all I have to report.

These entertainments were, for Wednesday evening a presentation of the play, What Shall I Do With Her? by home talent, as a special compliment to the Society.

Thursday evening a banquet to be given by the Board of Trade and their wives to the Society, preceded by the following toasts, Capt. C. E. Garner being toastmaster:

Welcome To Our Guests, Hon. R. D. Knight, Mayor of Jacksonville.

The Horticulturist's Place in Commerce, Hon. Charles M. Cooper, ex-Member of Congress.

Florida's Progress, From 1849 to 1899, Hon. George R. Fairbanks.

Vocal Solo, Mrs. Fred. Kann.

Farmers' Wives, Hon. John E. Hartridge.

Farmers' Institutes and Educational Institutions, Prof. H. E. Stockbridge.

The Florida Horticulturist, a Man Who Is Able to Carry His Eggs in One Basket and Not Upset the Basket, Rev. Lyman Phelps.

Recitation, The Telephone Message, Mrs. B. H. Chadwick.

What Successful Horticulture Means to Jacksonville, John G. Christopher.

The Commission Merchant, Our City Friend, Always Anxious to Make an Acquaintance, and Whose Acquaintance We Should Thoroughly Make, E. O. Painter.

Why the City Should Be in Sympathy With the Rural Community, J. S. Fairhead.

Vocal Solo, Mrs. John G. Christopher.

Diversified Agriculture, Mahlon Gore.

The Railroad the Farmers' Friend and the Farmer the Railroad's Friend, D. U. Fletcher.

Horticulture Between the River and the Deep Blue Sea, C. A. Bacon, with a Poem, "The Cracker's Lament."

The Farmers' Life; May They All Live to See Rural Mail Delivery, Farm Telephones, etc., Dr. Geo. Kerr.

Piano Solo, Mr. Floyd S. Fairhead.

The Jacksonville Board of Trade the Exponent of Economic Progress, J. M. Barrs.

Come Within Our Gates Again, C. E. Garner, President Board of Trade.

Violin and Flute Duet, Masters Leo and Edwin Benedict.

## DAMAGE FROM COLD.

**Modifying Effects of Moisture—Hammock Groves vs. Pine.**

A Discussion.

[See minutes, pages 1 to 5; item 9.]

Prof. H. E. Stockbridge: All I have to say on this subject I have prepared in writing. If I were to begin to talk I should talk too long. I much prefer to confine myself to what I have committed to paper. I will say, however, in a general way, that the subject was talked over by the committee about a month ago, and we sent circular

letters making inquiries to the horticulturists in the State. The replies have been numerous and interesting, but the most singular thing is this fact, that there is no single question with reference to the prevalence of cold on which the horticulturists are united. Not a single question the replies to which were unanimous. The lesson which seems to me to be of necessity to be learned, before it is possible to obtain any actual protection against frost, is that we must have more systematic study of the actual conditions which govern frost and cold. Cold is nothing more than the absence of heat, and manifests itself in accordance with natural law. We are absolutely ignorant of the action controlling this condition, and before it is possible to suggest means by which its effects can be prevented, we must give to the subject protracted and systematic study. Some desultory things have been accomplished. We find that in response to our inquiries there was a difference of opinion as to whether the atmosphere was coldest at the top or at the bottom of a tree. Opinions as to the reason for attempting protection by wind-breaks brought out the fact that few persons understand the reason. It has been ascertained that forest trees have a fixed temperature the year round of 12 or 15 degrees warmer than the surrounding atmosphere, so that they afford not only protection from the wind, but actually contribute warmth to other trees in their vicinity. So I say that although the committee has made some attempts toward securing data and important facts, I think we have gone far enough to believe that when we thoroughly understand the laws controlling cold, or absence of heat, we shall find that methods of protection are fully as natural as the law of sunlight dispelling mists.

Rev. Lyman Phelps: All that Professor Stockbridge has said is very interesting. Ask the oldest inhabitant if he ever saw two freezes in Florida in which the conditions were actually the same. I have kept a record of the current of winds and the height of cold strata, but have never seen the same conditions one foot from the ground, nor the same six inches from the ground. This winter trees which were frozen stiff three feet from the ground, were not killed the previous freeze. Groves that were not killed within 10 or 12 feet from the ground in 1895 were utterly annihilated last year, that actually had hammock protection. It is true that when we do find out these conditions, we will then begin to know something. I have also found that groves without timber protection during some of our freezes were the least hurt.

Prof. Stockbridge: The remarks of Mr. Phelps remind me of one fact which might be interesting to state here. I recognize the fact that no two freezes are alike, and that one grove might be killed and another have absolute immunity. But the point is that we have thus far failed to give sufficient attention to the importance of the influence of moisture upon heat. The merest slight difference in the amount of moisture in the soil may influence the atmospheric temperature to the extent of one, two, three, five or even six degrees. Therefore, different results from different conditions which seem to us to be identical, may be explained by this fact. It would not be possible by ordinary means to know whether a given soil upon which was situated a given grove contained at a given time 30 or 35 per cent moisture. The difference of 5 per cent of moisture, however, would explain why one grove is ruined and another escapes without damage. I believe we are learning

something of fundamental principles upon which we will be able to rear a structure which will become of some actual practical benefit.

Mr. Phelps: Two trees are two individuals, and never in the same condition.

Mr. Bacon: Mr. Phelps took the words out of my mouth when he began by saying there were no two freezes alike. Besides that, they are of a different quality every year. This year, after the freeze, I felt proud of myself and of my grove. I went out the week after the freeze and found my grove budding and the buds swelling out. All beautiful. Since then they have died, day after day, until now I don't know how much more they are going to die. I trimmed 25 per cent of them on a step-ladder and 50 per cent of them on my knees. If they had been banked four feet higher they would have been saved.

The day before this last freeze the thermometer stood at 82 degrees. At 4 o'clock we had a thunder shower. I tried to get news from Jacksonville, and succeeded in getting the information that we would have freezing weather as far south as Tampa. Since coming to Jacksonville I have learned that as early as 10 o'clock a. m. on Sunday it was the common talk in this city that we were to have the worst blizzard Florida ever knew. Had some kind friend even sent us that rumor we could have saved six or eight hundred dollars worth of fruit easily.

I would like to inquire of Director Mitchell, if he is present, in what measure are the telegraph operators responsible for reporting the Weather Bureau reports, or is it simply volunteer service?

Director A. J. Mitchell: I wish to reply to the stricture which has been passed upon the Weather Bureau by Mr. Bacon, good natured as it was. I am glad the matter has been brought up before this large audience. The Weather Bureau in Jacksonville as well as in every State in the Union, is for the benefit of the people. I will tell you the reason why some people don't get any benefit from it. It is from the lack of circumspection and co-operation. I repeat I am glad the question came up. As early as Saturday morning I telegraphed the central office at Washington to send a special message if there were indications of a freeze, and received a special message Saturday afternoon from Washington. Prostrated wires delayed further communication with Washington, and Monday I sent a message on my own responsibility that a very severe freeze would prevail throughout the peninsula, and gave it the widest possible distribution. We knew that we would have severe weather thirty-six hours before it came and I utilized every avenue possible. We had the hearty co-operation of every railroad in the State of Florida, and six hundred telegrams were sent. After all, it is not so much the weather man as some of you might think.

# DAMAGE FROM COLD AND BEST METHODS OF PREVENTION. *

**The Action of Cold—Replies From Fifty Correspondents—Suggestions for Protection Based on the Practice of Florida Horticulturists.**

Report of the Standing Committee by Prof. H. E. Stockbridge Chairman.

[See minutes, pages 1 to 5; item 19.]

Mr. President and Gentlemen of the Florida State Horticultural Society—The committee appointed at our last annual meeting for the purpose of considering and reporting upon damage from cold and best methods of prevention has given much consideration to the important matter entrusted to its care. Each individual member has personally conducted experiments bearing upon the solution of the great problem confronting Florida fruit growers and the committee, as a whole, has had two different meetings during the year, beside having also carried on a somewhat extensive correspondence. Although it cannot be claimed that any solution, or indeed, immediate hope of solution, to the great problem under consideration can be presented, it is believed that data have been secured which will aid in further more effective study of the questions involved with the possibility of some degree of ultimate success in the direction desired.

Your committe has found that, although the intelligent horticulturists of Florida are, as a rule, well informed in the underlying principles on which success in their calling rests, there is, at the same time, considerable misapprehension as to the natural laws influencing or controlling the existence and behavior of frost and that, therefore, before presenting the results of our work, or making suggestions for procedure in the future, the more salient features or important principles upon which the action of cold depends should be briefly presented. We therefore beg to divide our report into three distinct divisions as follows: I. Principles controlling the action of cold; II. A consideration of replies received from correspondents; III. Suggestions for protection against cold based upon the principles involved and the practical experience of Florida horticulturists.

## I.

### Principles Controlling the Action of Cold.

1. Cold as a distinct force or substance does not exist. It is not even a form of

* A large part of the material for this paper was derived from Bulletin No. 23, U. S. Department of Agriculture, Weather Bureau, entitled, "Frost: When to Expect It and How to Lessen the Injury Therefrom," by W. H. Hammon.

matter, but simply a condition or degree of temperature and may be properly considered as really the relative absence of heat.

2. Frost is simply the congealed or frozen moisture of the atmosphere or exhalation from soil and vegetation resulting from the lowering of the atmospheric temperature at the point of deposition below the freezing point of water. This latter condition may be reached and frost, therefore, be deposited although the atmospheric temperature is several degrees above 32 degrees F., which is reckoned as the freezing point.

3. Cold being simply a condition indicating the absence of heat, the methods by which plants lose their heat, or become cold, are important. These are chiefly of two kinds, convection and radiation. In times of danger from frost the plant is usually warmer than the surrounding air. The movement of the latter constantly brings fresh supplies of cool air into contact with the warmer plant whereby the latter necessarily loses a portion of its heat and becomes reduced to the temperature of the air. This form or method of loss of heat to vegetation is called convection. Heat constantly escapes or passes from any warm substance passing through the surrounding space in direct rays. This condition is known as radiation. This radiation does not materially warm the air through which the rays pass, but any solid substance intercepting or obstructing the passage of the ray becomes perceptibly warmed thereby.

4. Atmospheric vapor is condensed when its temperature is lowered or it becomes cooled and this condensation results in liberating the latent heat of the vapor so that the deposition of frost, the freezing of water and the cooling of the atmospheric vapor to the point of its condensation into water is accompanied by a very considerable liberation or evolution of heat. The amount of heat thus liberated is approximately five times as much as is required to raise the same quantity of water from the freezing to the boiling point. It is, therefore, apparent and important that falling temperatures are checked when condensation of moisture takes place because the heat thus evolved prevents the further lowering of temperatures.

5. The temperature at which this condensation of atmospheric moisture takes place varies with the amount of moisture present at the time but is always the same for any given amount of moisture.

6. Radiation, which is the loss of plant heat and, therefore, results in cold and possibly frost, or freezing, occurs most rapidly when the sky or the overlying atmosphere furnish no obstacle to its free passage through the air. Consequently, radiation and danger from frost are greatest when the sky is clear and there are no intervening clouds or overlying layers of fog. Radiation is also greatest when the air is dryest. It occurs more rapidly from the surface of plants than from the surrounding air, so that it is quite possible for the surface of plants, at times when radiation is greatest, to be several degrees colder than the surrounding air. Radiation is also increased by stillness of air so that probability of frost is decreased while air is in motion or the wind is blowing.

7. Air, like all other substances, is more dense when cool than when warm. Cool air, therefore, because of its greater density, sinks to the surface of the ground as it cools, while the warm air of less density rises from the surface of the ground, so that the two form distinct strata, the one warm and the other cool, the former super-

imposed upon the latter. The result is that the air near the surface of the soil is much cooler than it is at the height of the top of the tree, so that, other things being equal, damage and danger are the greater near the ground. This same principle accounts for the fact that the air in low places, in hollows and valleys, is so frequently colder than on the surrounding highlands or hillsides. This fact also explains the less frequency of frost when the air is in motion since this motion results in disarranging the air strata, the mixing of the different layers and the accumulation of cold air at the surface of the ground. This free movement of air is, therefore, a protection against frost and anything which intercepts or interferes with this movement is an added danger from frost.

### WATER WARMER THAN AIR.

8. The latent and specific heat of water are far greater than that of air. Water also, because of its greater density, radiates heat more slowly than air. Proximity of water, therefore, not only furnishes a source of heat which, by radiation into the air, warms the latter, but moreover by its evaporation into the air, so increases the density of the latter as to materially affect its "dew-point" and diminish the possibilities of injury from cold.

9. Forest trees and growing vegetation have a far more fixed temperature than is possible of either the air or of other inanimate bodies. The trunks of forest trees, moreover, possess a nearly fixed, or uniform temperature, approximating 54 degrees the year round. The radiation of heat from these comparatively warm tree trunks when large areas of trees are involved, quite materially influences the temperature of the surrounding atmosphere and thus lessens the possibilities of cold.

10. The reason for the injurious effects of severe cold or freezing upon vegetation is that freezing of the plant creates exosmose action in the walls and enables the water, sap or vital fluid to escape. If the plant is dormant at the time of freezing, however, or if the thawing of the frozen plant takes place gradually, this water is re-absorbed by the cells by endosmose action as rapidly as liberated and little or no damage follows. When the plant is in a growing condition, however, or thawing takes place rapidly the water is liberated too fast to be re-absorbed so that decomposition sets in and death to the affected parts is almost inevitable.

## II.

### REPLIES RECEIVED FROM CORRESPONDENTS.

On April 10th the committee sent out to members of the Society, and other persons in the State who, it was believed, could furnish such information as was desired based upon personal experience, about two hundred copies of a circular letter which incorporated twenty questions to which specific replies were requested. Responses to these queries were received from about fifty different individuals from all sections of the State, many of which not only made reply to the queries, but furnished information directly bearing upon the main question at issue, viz., the effects of cold and methods of protection therefrom. These replies have been classified with such system as seemed possible and are here presented in the hope that they may form the basis for suggestions which may be of some little direct practical value. For convenience sake, each

question and the replies made thereto will be presented together.

1. If it were possible, what would be the objection to keeping orange trees in a dormant condition from December 1st to March 1st?

Thirty-eight correspondents are emphatically in favod of making trees dormant. Seven admit the desirability under specified conditions.

2. What has been the difference in the effect of wind-breaks of forest trees with or without undergrowth, and in the cases observed, what was the relation between the grove and the wind-break as to elevation?

Eleven prefer undergrowth as part of wind-break. Seven prefer undergrowth conditionally. Seven want no undergrowth. One favors undergrowth when the wind-break is above the grove. In no case is the wind-break alluded to below the grove or between it and water. The replies, therefore, do not apply to the connection between the water protection and the intervening obstructions.

3. What has been the apparent effect of proximity to water and what has been the relation between water and surrounding land as to elevation?

Thirty find water furnishes protection. Three oppose proximity to water. Three find conditional protection in water front.

4. In the event of proximity to water, what was the character of the space between the grove, or crop, and the water as to presence of fences, scrub, under-growth, bushes, or high grass?

Seven prefer close obstructions between water and grove. Eleven favor unobstructed passage between grove and water.

5. Has the effect of covering of any kind been that of a forcing house to start trees to growing earlier than otherwise would have been probable?

Five have found covering conducive to early spring growth. Twelve see no effect of covering upon earliness of spring growth.

6. What is the effect of autumn fertilizing and working upon the vitality of the tree? Do they thus start earlier or later than if left undisturbed?

Twenty-six believe that fall working is conducive to early spring growth. Thirteen do not believe that fall working affects spring growth. One replied in the affirmative as to old trees. One in the negative as to young trees. One replied that spring growth would be later if the trees were worked up to November 1st.

7. What effect has the fall sowing of covering crops, like oats or rye, upon the earliness, or lateness of spring growth?

Four notice no effect. Three believe the effect is beneficial.

8. How, in your opinion, can early growth be best retarded?

One replies that the object sought may be secured by encouraging the greatest possible growth in the fall. Fifteen have faith in leaving the grove uncultivated between August and February. One recommends banking. One recommends January plowing. One solves the problem by selection of variety, but does not specify his variety. One favors irrigation. Two favor mulching. Two advise a covering crop. Eight recommend root pruning. Eight recommend shade. Five, exclusion of all nitrogen or ammonia in fertilizers applied in the fall, and one affirms that the thing cannot be done, but that trees will start when they get good and ready. One replies, by freezing the tree or keeping it dormant. One recommends late fall growth

and not working between November 1st and March 15th.

9. What is the effect of proximity to water upon spring growth?

Twelve do not believe that proximity to water influences spring growth. Six think water hastens the same.

10. What effect would tight covering have upon the trees at blooming time?

Fourteen oppose covering. Three recommend covering.

11. What form of shed, shade, or covering, has been most useful?

Six prefer half shade slats. One suggests woven straw mats. One favors board covering. Four advise tents with lamps. One advises bamboo thickets and one recommends addition of cheese-cloth roof to shade.

12. What method of artificial heat has been most effective and economical?

Twenty-three prefer wood fires. Two prefer oil stoves. One advises coke baskets. One advises soft coal. One recommends lamp and tent.

13. What has been the effect of dry heat as compared with moist heat?

Four advise dry heat. Three prefer moist heat.

14. What has been the effect of smoke, or smudge?

Eighteen favor smudge for frost, but stipulate hat it is no good for a freeze. One believes in smoke and one has no use for smoke.

15. What has been the effect of running water, or irrigation, in groves or gardens?

Five favor running water in groves and three are against it.

16. What has been the effect of spraying, or sprinkling, the trees, or plants, as protection against frost?

Nine favor sprays or sprinkling and three oppose the same.

17. What is your observation as to relative temperatures near the ground and some distance above the ground?

Twenty-two believe the atmosphere is colder at the surface of the ground than six feet above. The range of temperature mentioned is 2 degrees to 6 degrees. The average of all specified replies is 3.5 degrees of difference.

18. In what direction or which side of trees suffered most from cold?

Two find their greatest damage on the south Two on the north. Four on the windward side. Five on the sunny side. Three on the west. Five on the south-east. Eleven on the north-west and five find it on all sides.

19. What effect has the condition of the wind had upon the results of frost?

Eight say wind prevents frost. Five believe it does not influence freezing. Three reply that the effect of wind is always bad.

20. What was the direction of the wind at time of greatest injury?

Forty-two reply that the north-west wind is the most serious. Two, the west. Two, the north.

## III.

### Protection Against Cold.

Before attempting to apply the information already recorded to the actual protection of crops against cold, it is first essential that the conditions under which the greatest damage from cold will occur may be fully understood as methods of protection must necessarily take into consideration not only the conditions prevailing at the time, but the actual conditions of growth under which damage is most serious or immunity from damage is most probable. There can

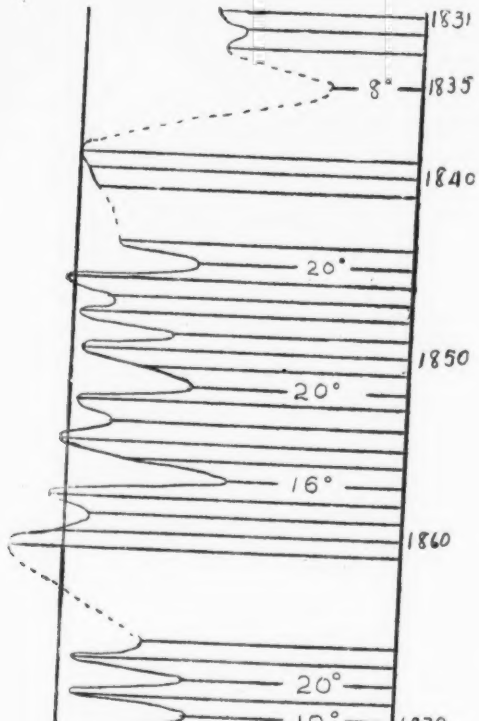
be no question that damage is proportional to the amount of vitality present at the time. The greater the manifestation of vital force or growth, the greater is the resulting damage and the more nearly dead or dormant that vegetation is at the time it is subjected to cold, the less will be the effect of the same and, other things being equal, the more rapid will be the recovery. Any tree or plant subjected to freezing when in a thrifty growing condition with its vital processes in full force is inevitably injured by the attack, while the same tree, if subjected to the same conditions of cold while its vital forces are at low ebb and its activities dormant, would escape with little, or no damage. This is the chief reason why the oak and the apple are comparatively immune to cold, while the china berry and orange suffer seriously under even relatively mild conditions of temperature. The natural inference of these facts, therefore, is that immunity from frost is proportional to the degree to which the tree is dormant at the time of attack and that the condition described as "hardiness" is simply the result of the comparatively protracted dormant state in the so-called hardy individual. Indeed, the only difference so far as immunity from cold is concerned, between the sweet orange and the trifoliata lies simply in the fact that the latter remains comparatively dead during the winter season and continues in this dormant condition for several weeks after orange trees have begun their spring growth, or indeed may be covered with bloom.

### ALL HORTICULTURISTS ADVOCATE DORMANCY.

These facts are so well recognized that among forty-five correspondents who replied to our question as to the desirability of maintaining trees in a dormant conditon during the winter months, thirty-eight replied emphatically in the affirmative as to the desirability of this condition, while the other seven admitted the desirability under certain conditons. The only objection raised to this condition is one which requires attention at this time, viz., the fear that trees kept dormant during the winter months would begin growing so late in the spring that either their fruit would be caught by the May drouth and partly lost, or that the crop would result entirely from June bloom, always yielding a lower grade of product. So far as these objections are concerned, the parties raising them seem to have entirely forgotten the most important fact today confronting Florida growers, viz., that they are no longer producers of fruit but growers of trees and that unless the trees can be first grown and protected from freezing meanwhile, there is absolutely no possibility of ultimate fruit to be affected in this way. For three years, therefore, at least, conditions affecting the production of fruit are absolutely of no importance to the average Florida horticulturst. The only consideration of interest to him lies in the question of how he may again become the owner of bearing trees and meanwhile protect his growing trees from injury by frost. This fact being considered, it is safe to assert that the unanimous opinion of the orange growers of Florida is that the tree, during its period of growth, must be kept as nearly dormant as possible from the first of December until the first of March and that any, or all, means conducive towards this end are positively our best and most effective protection against the possibilities of damage from frost. The conditions, therefore, most likely to conduce to this end are of vital

10°
14°
15°
19°
19°
20°
1899
1890
1880
1870

19°
19°
20°
1850
1870


1831
8°
1835
1840
20°
1850
20°
16°
1860
20°

importance to every orchardist and furnish him with the most probable effective means of protection. It is well, therefore, to consider the suggestions offering the most probable means of effecting this desired dormant condition of the tree during the winter months.

HOW TO BRING ABOUT DORMANCY.

The weight of evidence is almost conclusive that the grower may exert a very material influence in controlling this desired conditon. The courses of treatment exerting most influence in this direction are:

1. The omission of fall working of the grove, leaving the soil undisturbed from September until Februray.

2. If fall fertilizing is to be followed, mineral fertilizers only should be used, all nitrogenous or ammoniated fertilizers being religiously excluded from the grove during this period. The result of this course of treatment is based on the well known fact that ripe wood and ripe fruit are far less seriously affected by cold than is the case with green wood and green fruit. Nitrogen is conducive to a rank, sappy growth which cannot mature or harden before cold weather sets in if the application be made in the fall and, therefore, trees to which nitrogenous fall applications are made are in the very condition to suffer most from cold weather at the time when probability of cold is greatest. Potash and phosphoric acid, therefore, should be relied upon exclusively for fall applications and furthermore, where such applications are made, the slightest possible cultivation, the shallowest working and the least disturbing of the surface soil possible, should be practiced.

3. Root pruning, unquestionably, conduces to a dormant condition of the tree at the time when such a condition is desired. It must, however, be borne in mind that the roots may be so pruned as to result in extinction, rather than in temporary suspension of vitality. The object desired can be easily secured by the use of a long spade made for the purpose with which the roots of the tree may be cut in a circle, the diameter of which must vary with the size or age of the tree. Under no circumstances, however, should the entire circle be cut in any one season. One-fourth of the circle is probably a segment sufficiently large to meet the average conditions, and the same segment, or part of the circle, should never be cut in two consecutive years, but the circle should be continued in following years until completed.

4. Different varieties vary materially in the time of starting spring growth and a careful study of dates is recommended and the selection of those vareties found to remain dormant the latest. In this connection it may perhaps be well to say that the efforts at present being made by the Department of Agriculture for securing a hardy orange tree by hybridization, if eventually successful, will doubtless owe their value, not to any actual increase in immunity from cold due to a difference in the effects of cold upon one tree as compared with another in the same condition, but will simply depend upon the degree to which the new tree shall remain dormant at the time when subjected to severe cold.

With this recapitulation of the conditions under which the protection of trees may be most effective, we are in position to consider the actual methods of protection. These must necessarily resolve themselves into two different classes, as follows: 1st. Methods depending upon prevention of

loss of heat from natural sources. 2d. Methods of supplying artificial heat. When merely cool nights with the possibility of frost form the condition to be met the first class of methods suffices, but for those exceptional freezes and blizzards, the devastating examples of which were experienced in '95 and '99, both methods must be united.

**PREVENTING THE LOSS OF NATURAL HEAT.**

This consists really in simply retarding, or diminishing, radiation, as the loss involved is due almost entirely to this cause. All methods for accomplishing this end depend upon one or the other of two principles already mentioned, viz., the interposing of an obstacle in the way of the escaping heat rays, and in so increasing the density of the air as to render passage of the heat rays more slow and difficult.

All methods of the first kind are mere modifications of the simple practice of protecting house and garden plants by covering them with papers, sheets or other convenient fabrics. Covering is the essential, and the sole cause for its efficacy lies in its prevention of the radiation, or loss of heat, already present in plant and soil by interposing an obstacle in the way of its passage into space.

The simple paper, or cloth covering, has been elaborated until the different forms of shade, shed, or house protection have come into vogue. The most widespread and probably effective among these forms of protection is the half shade woven lath and wire shed, the cost of which, about $400 or $450 per acre, renders its use prohibitive by any except large or well-to-do grove owners, although its use in the pineapple industry is not so dependent upon this objection. The effectiveness of this form of covering is greatly increased by any means through which the space between the laths, or slats, may be closed, or covered, at the time when greatest protection is needed. An arrangement of alternate slats is frequently used for this purpose, but the warping of the slats, so that they may fail to close the alternate space, is likely to prove a serious objection to this form of protection. The addition of a burlap or cheese-cloth covering to the slat shed has been frequently resorted to with advantage. The trouble in manipulating such covering and the increased cost of its use furnish, however, objections to its general introduction, but there can be no question of the effectiveness of the protection thus afforded. It would seem, however, that if the slat shed does not furnish adequate protection but must be supplemented by an additional covering of cloth whenever severe cold is expected, that the wooden or slat shed, which really furnishes little if any more protection than could be secured by the cloth covering alone, might be entirely dispensed with. Your committee, therefore, suggests the possibility and desirability of utilizing a modification of the cloth shelter used in Italy and Southern France, for which purpose a superstructure consisting of a network of wires crossing the grove at right angles and suspended from permanent poles at the height of the tallest trees is necessary, forming, therefore, really the usual hop yard arrangement and that the cloth, or burlap, covering be so arranged that by means of pulleys it can be easily drawn over the wire supports in sections and fastened in place by guys. A similar protection in the nature of a cloth screen, or wall, upon the windward side it is believed would effectively prevent the entrance of wind which might otherwise interfere with the cloth covering.

These methods all depend upon the erec-

tion of more or less permanent and expensive structures. Nature, however, shows how protective covering may be secured, frequently entirely adequate to meet single emergencies without the expense or previous preparation required by all forms of permanent structure.

(A) THE VAPOR BLANKET.

Allusion has already been made to the fact that danger from frost was seldom imminent upon cloudy nights and that where fogs floated near the surface of the earth frost was impossible. Both clouds and fogs are simply the vapor of water floating in the air at varying distances from the surface of the earth and the immunity furnished by them, it is therefore reasonable to be supposed, might be secured by the calling into existence of an artificial vapor blanket, which by lying close to the plants to be protected, should render danger from cold less imminent. The important fact to be borne in mind in this connection is this, that the activity, or efficacy, of this protecting vapor blanket will be proportional to the amount of moisture which it contains.

The vapor may be of two kinds, smoke, or smudge, and vapor of water, or steam. The protective action of this vapor covering is of two fold: first, by actually supplying a medium or covering through which heat rays pass less readily than through air, and second, by increasing the humidity, or moisture, of the atmosphere and thus raising the dew point.

Many suggestions have been made as to effective methods, more or less practical, by means of which this protective covering could be secured. The effectiveness of all, however, depends upon the degree to which the covering may be made to consist of the vapor of water. In other words, effectiveness demands that the fuel, fire or heat, emitting the smoke, or smudge, must, at the same time, be made to convert water into steam. The materials usually suggested for accomplishing this end have been wet straw, or manure, each of which material is a slowly combustible fuel, sufficiently wet to emit large quantities of steam during the process of combustion. Neither of these materials, however, is available except in isolated localities in Florida.

(B) THE SPANISH MOSS.

Actual experiments of your committee, however, have demonstrated that we have available, in all parts of Florida, a material perfectly answering the requirements of the case and possessing all the advantages claimed for either of the materials mentioned. This substance is none other than the green Spanish moss, easily secured in limitless quantities anywhere in our State. Its natural moisture renders its combustion slow and, if artificially wet, it can be made to furnish the protection claimed for manure or for wet straw by the grove owners of California. The protective action of the wet smudge is due to two facts; first, it renders available and effective the latent heat of condensation, i. e., all the heat consumed in evaporation of the water is made active again upon the condensation of the water and tends to raise the temperature of the atmosphere in which this condensation takes place to just this extent. Second, the heat utilized for the evaporation of this moisture is in this way carried to all parts of the atmosphere through which the moisture is distributed and, therefore, is not confined to the simple place of origin but is, in this way, carried through the surrounding air to the entire area to be protected.

In this connection it must be remembered

that vapors, or gases, distribute themselves quickly and evenly through the space to which they have access and that water vapor or steam must necessarily be very much warmer than the air, so that the latter necessarily condenses the vapor, thus liberating the latent heat obtained from the fire evaporating the water.

Many and varying methods for the practical utilization of these principles have been suggested, into the details of which it is not possible to enter at this time. In passing, however, it should be said that the fires, or smudges, to be used should be portable rather than stationary. They can thus be moved from place to place as their action is most needed, or as the temperature or wind may change, but more important yet, by their moving from place to place, or constant motion, the upward draft, so serious a detriment to the effects of stationary fires, is almost entirely prevented, so that the actual heat generated becomes available at the place most needed instead of, as is otherwise so commonly the case, passing off into space and becoming lost.

### (c) A PORTABLE SMUDGE.

The most effective method for rendering the fire or smudge portable is the placing of the same upon a vehicle which may be drawn from place to place through the grove, or preferably kept in constant motion between the rows of trees by team. A wagon, the floor of which is protected from the fire by sand, or an improvised sled with scantling with bevelled ends for runners, admirably answers this purpose. The fire, either of wood, coal, tar or rosin, should be placed upon the sanded floor of the wagon or sled and the wet moss, or other smudging material should be elevated about one and one-half feet above the level of the floor by a wire screen or a section of fencing suspended from corner posts. The smudge material, it should be added, should be kept as wet as possible and allow of combustion, by being constantly sprinkled with water carried upon the vehicle.

### (d) INCREASING THE HUMIDITY OF THE AIR.

It will be seen that this matter of preventing the loss of natural heat resolves itself chiefly into a question of means and methods for increasing the humidity of the air and the further suggestions offered in this connection are simply directed toward achieving this end. Proximity to water, either fresh or salt, resulting in evaporation into the atmosphere, the humidity of which, therefore, becomes increased, offer a very common and effective means toward this end. It is, moreover, a noticeable and noteworthy fact that groves situated upon low lying soils which receive the seepage from bodies of water, enjoy greater immunity from cold than groves of the same elevation but not so situated as to availability of water. The explanation of this fact more usually offered is the warming influence of bodies of warm water and this condition unquestionably partly explains the result where the water lies to the windward of the grove so that the movement of the air is from or over the warmer water toward the colder air surrounding the grove. In very many cases, however, this condition has not existed, although the presence of water has unquestionably had great influence upon immunity from cold which must, therefore, be explained by the action of the water upon the soil itself. This action is wholly in accordance with the principles already

stated and results from the fact that wet substances always give off moisture into drier surrounding substances. The water from the wet soil, therefore, evaporates into the dry over-lying air, the humidity of which becomes increased thereby with results exactly the same as where water is evaporated and the humidity increased by artificial means.

Among several note-worthy instances of this nature, the grove of Mr. E. P. Porcher, on Merritt's Island, nearly opposite Cocoa, on the Indian river, furnishes a marked example. This grove is located upon hammock soil close to the Indian river, the level of which is nowhere more than two feet below the surface on which the trees stand and at the time of the February freeze of this year the water level in the grove was not more than eighteen inches from the surface of the ground. This soil was, therefore, at that time thoroughly saturated with moisture constantly evaporated into the air, which, therefore, was at all times, thoroughly charged with vapor through which radiation of heat was difficult. The result was that this grove possessed almost absolute immunity to cold and simply suffered in a few of its topmost sprouts and at the time of the visit of your committee on March 31st, was covered with new growth and white with bloom. The more common explanation for such occurrences as this depends upon the mere warming effect of the water itself upon the surrounding air. In the case mentioned, however, other groves in the immediate vicinity with far better wind protection and almost identical proximity to water, but situated on drier lands, through which seepage and water evaporation were comparatively slight, suffered very much more seriously. The explanation must rest largely in the evaporation of moisture from the wet soil on which Mr. Porcher's grove stood.

### (E) IRRIGATION HELPFUL.

The natural, indeed inevitable, conclusion is that if superabundance of soil moisture, secured by natural means, effects so material an influence upon the action of cold, similar conditions would be equally effective if secured by artificial means. Irrigation is a means towards this end. Among our correspondents several admit the beneficial effects of irrigation, but nowhere is there a better recorded instance of its effects than furnished by the case of Mr. I. H. Thomas, of Visalia, California, who reports as follows to the California State Board of Trade: "I turned the water on my place a few days before the freeze. * * * Wherever the water was run, the effect of the frost was neutralized and the fruit was not damaged. By reason of this precaution I will have a good crop of fruit, while some of my neighbors, who resorted to smudging, lost almost their entire crop. This proves one thing of great value and importance to the fruit-growing industry, that by wetting the soil during these periods of freezing, and causing an evaporation of moisture tempered by the warmth of the soil, the frost is neutralized, and damage averted.

"In my orchard, where the thermometer fell as low as 28 degrees, this process resulted in saving my crop from material damage. As a further evidence of a proof of this theory, the Visalia Fruit and Land Company's orchard, on St. Johns river, for thirty or forty rows nearest the river as far from the banks as the seepage was sufficient to cause an evaporation of moisture, the fruit was not materially damaged, while back of that, where there was no seepage

and where the land was perfectly dry, the crop was ruined.

"In one spot on the 40 acres that was flooded there was a piece of raised ground that contained 20 or 30 trees, which the water did not reach. The fruit on the trees of this spot was killed, while as soon as you came to the trees on the flooded portion, there was no perceptible damage."

It must be borne in mind in this connection that whatever the possible results of irrigation may be, ditch irrigation, as practiced in California, is, as a rule, not practical upon the soils of Florida. The same object, however, can be gained by overhead or surface irrigation by means of sprinkling, facilities for which are already provided in many Florida groves, but which have seldom been used for the purpose here suggested. The fact should also be mentioned in this connection that sprinkling, or more properly the spraying, of groves, trees or gardens, furnishes immediate protection in two other ways than that through the medium of the soil. First, the humidity of the atmosphere is immediately increased by the presence of the water, so that all the advantages of increased density of the atmosphere through its presence are thus made available. Second, water itself, when applied in the form of fine spray, most effectively used from considerable heights, not only imparts direct warmth to the atmosphere, but, in times of severe cold, furnishes one of the best non-conductors of heat, so that a thoroughly sprayed tree, if the water be applied in the form of finely divided mist, is soon covered with a non-conducting film resulting in the retention of the natural heat of the plant itself. This condition is materially enhanced when the temperature falls below the freezing point so that the mist or watery vapor becomes congealed and the tree covered with a non-conducting layer of ice. It will, of course, be understood that this burden of ice must not be allowed to accumulate to the point of injury through breaking down of branches, but up to the point of endurance in this direction it is believed that no more effective means of protection can be suggested.

The suggestions made under this division of our subject must be interpreted as applying only to moderate degrees of cold, though it is probable that they would suffice for absolute protection without artificial source of heat down to a temperature approximating 20 degrees. Past events, however, demonstrate the occasional necessity for protection against temperatures considerably lower than this, for which it is improbable that any other means than actual supplies of artificial heat can be devised. In passing, however, before leaving the subject of the preservation of natural heat and going to that of supplying artificial heat, your committee would allude to the almost universally accepted and practiced desirability of protecting the buds and trunks in tenderest parts of trees by banking them as high as is feasible above the general ground level, and the possible utility of the use of manufactured cloth tents and paper shelters devised for the protection of individual trees.

## SUPPLYING ARTIFICIAL HEAT.

The means for accomplishing this end are of two kinds. First, by actual fires for which different kinds of fuel may be used, and second, by the utilization of heat from natural sources.

### 1. Fires.

Of the entire number of correspondents replying to our query as to the most effective means for securing artificial

heat twenty-three preferred wood fires, oil stoves, coke baskets, soft coal and lamps being the other sources of heat mentioned. There can be no question that for Florida conditions fires supplied with fat lightwood form the most available and economical means towards the end in view. Our correspondents show that the average cost of this protection has been $23 per acre for fuel, estimating the wood at $2 per cord, delivered in the grove. The average amount of fuel has been 11½ cords per acre and the average labor required has been 1 1-3 men per acre. No data are available in Florida for determining the actual cost of other fuels for this purpose. California statistics, however, estimate the cost of coal used in coal baskets at 7 cents per fire which, with 100 fires per acre make a total cost of $7 for protection irrespective of labor, per acre, the labor involved being somewhat less than is the case with wood as fuel.

### SITUATION OF FIRES.

The first precaution which suggests itself is that the predominance of fires should be upon the windward side of the grove, and second, that there are in most groves cool spots which should be sought out before hand by the thermometer and should be given the necessary additional protection to secure even results. Variations in wind lead also to the suggestion that fires should not be built directly upon the ground, but upon movable sheets of iron which, if turned up and perforated at one corner, can be easily dragged from place to place as the wind shifts. One of our correspondents further suggests that this sheet of iron be hinged in the middle, so that, previous to being used, it may be bent over the pile of fuel which will thus be protected from storms by an iron roof, which proceeding would have obviated the very serious difficulty experienced by many growers during the recent February freeze in igniting fuel covered with frozen sleet.

### A MOIST HEAT.

The greatest disadvantage attendant upon the use of stationary fires lies through the unequal distribution of the heat because first, of the difficulty of radiation, and second, because the warmer air rises, bringing in masses of cold air to replace the same whereby an upward draft is created, extremely wasteful of the heat evolved. This difficulty may be obviated to a greater or less extent by two simple means; first, by the building of many small fires rather than fewer large ones, and second, by increasing the density of the air by causing the fire to evaporate water as has already been suggested. Actual sprinkling of the fuel itself, or the use of wet absorbent material like green moss, or for permanent use, small masses of mineral wool which can be saturated with water, thrown upon the fire, and not being destructible, can be wet as often as they become dry through the evaporation of their moisture.

In view of all the principles involved there can be no question that the union or utilization of these two principles, the use of fires and the evaporation of water, is far more effective than either could possibly be by itself, and that, had this method been generally resorted to during our last freeze, the protection afforded by fires would have been very materially increased and the damage resulting would in many cases have been comparatively slight.

It should also be borne in mind that the effectiveness of the fire is enormously increased when a sheltering roof of cloth on slats interferes with the rapid radiation of

the heat evolved. No loss through slats.

Only one other method of applying artificial heat seems to be sufficiently practical to demand consideration. We refer to the use of oil lamps or small oil stoves inside of cloth or water proofed paper shelters, experiments with which, though indicating the possibilities of protection, as yet are not sufficiently conclusive as to justify general individual adoption, except perhaps with very young trees.

**Warming the Atmosphere by Means of Heat of Natural Origin.**

Here again we come to the utilization of water based upon the fact of its very high specific heat. More than six times as much heat is required to raise the temperature of water one degree as is necessary to increase the temperature of most other substances to the same extent. The result is that when water cools, more than six times as much heat is given off as is the case in the cooling of other substances. Soils are extremely absorptive of water, being capable in some cases of retaining as much as 84 per cent. This water contains several times as much heat as does the soil itself. As a result when the earth's surface begins to cool at night by radiation, the saturated soil is supplied with a source of heat three or four times as great as is the case with dry soil. This heat of soil water radiates into the atmosphere very much more slowly than the radiation of heat in the atmosphere itself. The cooling of moist soils, therefore, is slow but supplies a constant source of heat, sufficient to materially raise the temperature of the over-lying air and often prevent the possibility of frost. This fact is one of very material importance sufficient to justify its being taken advantage of by artificial means through the irrigation of soils immediately previous to a suspected frost or freeze. The caution must be expressed, however, that this artificial supply of soil moisture should be adopted only at a time when danger from frost is anticipated, because, if repeated, the unquestionable tendency is to hasten plant growth, bring dormant forces into activity and render trees more susceptible to freezig than would have been the case without the vivifying influence of the added water.

Having reviewed the conditions rendering protection from cold necessary and dwelt upon the most probable means for affording protection, the most important consideration is that of foretelling the time of the probable necessity for protection.

WHEN IS PROTECTION NEEDED?

A simple and effective means available to all horticulturists exists for pre-determining the probability of freezing weather with reasonable certainty. The principle depends upon the relation between atmospheric temperature and humidity of the air. The hygrometer, or dry and wet bulb thermometer, furnishes cheap and simple means for determining this point, and whenever this instrument shows a "dew point" approaching the danger line, preparations for protection should be made and may be expected to be needed with reasonable certainty.

Your committee recommends the general use of this apparatus as well as of standard thermometers as placing the user to a degree in control of the conditions surrounding him and tending to a more accurate knowledge of principles of vital importance to his profession and himself.

In conclusion we desire to extend most hearty and appreciative thanks and acknowledgments to the very many members

of the Society and other citizens of the State who have co-operated with us in the work we have sought to perform.

---

NOTE 1.—For a reliable and convenient exposition of the principles involved in Frost Protection and the results experiments made in California, possessing considerable application to Florida conditions, the Committee heartily recommends Weather Bulletin No. 186, of the United States Department of Agriculture.

NOTE 2.—As bearing upon certain points raised we desire here to incorporate certain results from important and interesting temperature records made by Mr. Bradt, of the Committee, during the winter. The average difference between temperatures taken at 6 inches above the ground and 5 feet from the ground was 3 degrees. The average difference in temperature at 6 inches from the ground and 10 feet from the ground was 4 degrees, the higher temperature being at the greater distance from the ground in each case. The average difference between temperatures taken 3 inches from the ground and 5 feet from the ground in open air and in broom-sedge field with partial protection was 2 degrees, the higher temperature being in the open air. The air close to the trunks of trifoliata trees bare of foliage on February 28th, with "dew point" at 12 degrees was 2 degrees, higher than in the open air away from the tree. On February 9th., with the "dew point" at 11 degrees, the difference in temperature was 5 degrees. The average difference in temperatures in the open air and in the trunk of a tree was 13 degrees, giving indisputable evidence of the warming power of trees upon the surrounding air.

---

## PROTECTION OF TREES.

**Forest Protection—Hammock and Pine—Coal Fires and Pine Fires—Sheds for Trees.**

A Discussion.

[See minutes, pages 1 to 5; item 11.]

Mr. Fairbanks: As I understand it, the experiments made with forest trees demonstrated the fact that the trees themselves contained several degrees higher temperature, and the protection supposed to be derived from the trees came more from this higher temperature than from the protection from the wind. I have had a great deal of experience with forest protection. In a portion of a grove the trees were all cut out except the palmettos. In other portions the trees were allowed to grow to a great extent. In all of the freezes we have had for twenty years the forest protection has been very decided against frost, and has saved a quantity of fruit, but in the open the bloom was more or less destroyed. I think probably that the forest trees are valuable for

two reasons, one as a windbreak, and the other is that it not only shuts the trees in and protects them from frosts in winter, but in summer against too great an evaporation of moisture from the soil. I would like to hear from others on the subject, from various portions of the State. I do not believe we should be wise in clearing out our hammocks when it affords us such good protection both in summer and winter.

W. H. Jones, Orange Bend: In reference to forest and palmetto protection, we have an orange grove that is so situated that the palmettos are very thickly strewed throughout, and until the last freeze we have alyays escaped, but this past year we have found ourselves in the same boat with everybody else. I would like to know how it is that we have escaped before when the winds were from the Northwest, and at this time did not. Last year I shipped over 500 boxes of oranges in crates; this year don't know that we shall ship anything. I don't think it is exactly the location of the frosts; it seems to come in streaks. I would like to get further information on the subject.

Dr. Kerr: I will say in relation to the groves in Volusia county and the hammock groves along the St. Johns river, where a dense growth of hammock for perhaps two or three hundred yards surrounds these groves, the groves were hurt worse by the freeze of February 12th and 13th than the groves on the high, dry land. Much worse. They were hemmed in by these hammocks. I have seen one in Volusia county that is not surrounded by hammocks which has stood the last freeze and $1,300 worth of oranges were sold off it the past season. The Jones grove in the hammock is in bad shape, also a number of others. I examined them a few days ago.

Mr. Fairbanks: I think that experiments as to the protection afforded by forest trees have demonstrated that it is good down to say about 20 degrees, but when the thermometer goes down to 10 degrees that protection ceases. Those trees in which the sap has risen to a greater height than in others are not in as good condition to withstand the extreme cold as those which are hardened to it.

Mr. Jones: As regards the sap in the trees, what time would you suggest as being the best time to cease cultivating the trees?

Mr. Fairbanks: In November. I think that when Nature has gone to rest in other things it should in orange trees.

Mr. Bacon: In regard to heat in the trees, that is something that is quite new to me, and which had not occurred to me before, and I think there is perhaps a great deal in it. In some instances hammock groves suffered more in the last freeze than those on high lands.

Trees may be killed near the ground and above the banking, while the tops may be uninjured. We don't bank our trees high enough. Why not place a cylinder around the tree and fill it with sand or moss; that would prevent the rain from washing it down.

Mr. J. D. Price at Ormond fired with soft coal, price $4.50 per ton, had it suspended in woven wire baskets, two feet from the ground; thinks it would have been better on the ground; had fires at about every third square; greatly pleased with the result; saved nearly all his trees.

Mr. John Anderson used pine wood, seasoned since October, had rows of fires between the fourth and fifth row of trees. The rows next to the fires were not frosted; those beyond were hurt badly, but not killed. I think he is in favor of coal.

The building of sheds for pineapples I believe to be sane, but for orange trees insane. Let me offer a prediction. These blizzards are not to be continued, and in five years, more or less, these orange tree sheds will be piled around the borders of the groves they covered, or, perhaps, my friend W. S. H. will utilize his to stand on the top and pick oranges from the trees that have grown above them.

Mr. Putney: We all know that strawberries, when covered with a light coat of pine needles and straw, preserve their vitality and heat during the cold weather. Those who have grown strawberries for a long time recognize this fact. They have a heat of their own, as our bodies have. This is also true of every vegetable and tree that grows, the orange tree included. The object lesson I had this past winter will perhaps aid you in formulating a new theory. I have a grove bounded north, south, west and east by high pine trees. It is in Lake county, west of DeLand—a very cold section. I have avoided cultivating the grove very late in the season, and have succeeded in keeping the tops of my trees, but the last cold wave proved very serious. Only 30 or 40 per cent of those trees have sprouted five feet above the surface. Why has not the vitality sufficed? The fact of it is, it snowed this time. Those of you who have tried a snow bath know that it has a chill in it, and that it reduces vitality. When the cold did settle down, the trees had already become so reduced in vitality that they were ready for more disaster.

Several years ago I had some splendid Colon peach trees. One year they matured a very fine crop; the next year they were blighted by the cold wind. A very short distance from this grove I had a grove on Lake Dora, close to the lake and down on the margin. The trees were sheltered by a hammock. These are the only trees in all that section which came out with one-half or two-thirds of their growth. The principal reason is that they were grafted below the stocks which were killed out in 1894-95.

Dr. Kerr: In regard to banking trees; Mr. Robinson, of Sanford, had his trees banked three or four feet high, which was carefully attended to, but after the embankment had been removed these trees which were so high banked did not show, in comparison to the other groves which were low banked, any advantage whatever. It has been supposed that the cause of this was the wind shaking the tree and allowing the rains to percolate through the sand, and thus forming a funnel shaped opening about the body of the tree, increasing the damage.

In regard to hammock protection, referred to by Mr. Fairbanks, in which I concur; My own idea in regard to these groves being hurt more than others, was that they were growing rapidly. The moisture which surrounds them caused the trees to grow rapidly, being in vigorous growth at that time. Consequently they were more subject to the chill and frost than were the others. I believe that to be the reason, after the mercury goes down to 13 or 14 degrees.

Mr. Hubbard: When the air is still, cold air seeks its level. The thermometer on the pillar of my porch while showing 42 degrees eight feet from the ground, will, when placed on the ground show a temperature of 32 degrees, and so on at the same ratio, about 1 degree to the foot, up to ten feet.

Mr. Jones: G. P. Lovell, of Orange Bend, banked his trees, and he saved about ninety per cent. of them. He banked some of them with earth and hay, but the water coming in and the hay being saturated, it

was a solid block of ice, ruining his trees. The trees were about five feet high. I think myself that soil is the best thing we can bank with. There is only one objection I have to it, and that is that it encourages lice, Banking with hay brings rats' nests.

Mr. Hart: As Mr. Hubbard has said, the coldest stratum of air is that just nearest the ground, therefore the danger point is near the ground. Yet the weakest part of the orange tree is in the bud. We may yet save the whole tree. In the matter of banking, a few inches higher or lower is unimportant. In all my banking I have never had any trouble with lice or rats, so long as humus or organic matter was left out.

Mr. Bacon: In connection with the high banking; Mr. Hart's idea seems to be that the danger point is between the junction of the bud and stock. If a cylinder three or four feet long is put around a tree and banked outside with sand, with the heat from the tree itself, and from the sand outside, why is not that tree protected?

Instead of banking against the bark of the tree, the cylinder around the trees is banked, leaving an air space. No danger there from lice, rats or mice.

## ROOT PRUNING.

### As a Protection Against Cold.

Remarks by Mr. Smith.

[See minutes, pages 1 to 5; item 12.]

In my opinion instead of talking so much about outside conditions, we should consider means by which to get the orange tree into condition to stand more cold. Then we would be better off than with extraneous protection. We can go very far toward doing that by putting the tree into the best condition and putting into it the greatest amount of passive sap, which differs from active sap in that it puts the trees into a condition where it will stand more cold.

Two years ago we had nearly 1,000 grape fruit trees and 7,000 orange trees. We wanted to push the grape fruit trees and put them into the best possible condition, but not the orange trees. It occurred to me about the first of October that our trees were making such a growth that if the cold was to come it would kill the trees. I therefore went around the grape fruit trees and cut the roots, eight inches in the ground. When the cold did come, the orange trees were all frozen but the grape fruit trees, although more tender, stand there today as an evidence that in cutting and sending the sap back into the ground, we left them in a better condition, ten to one, than the orange trees which were left alone.

# SOME CLIMATIC HISTORY.

**Range of Temperature, its Cause and Effects.**

By Geo. R. Fairbanks, Fernandina.

[See minutes, pages 1 to 5; item 13.]

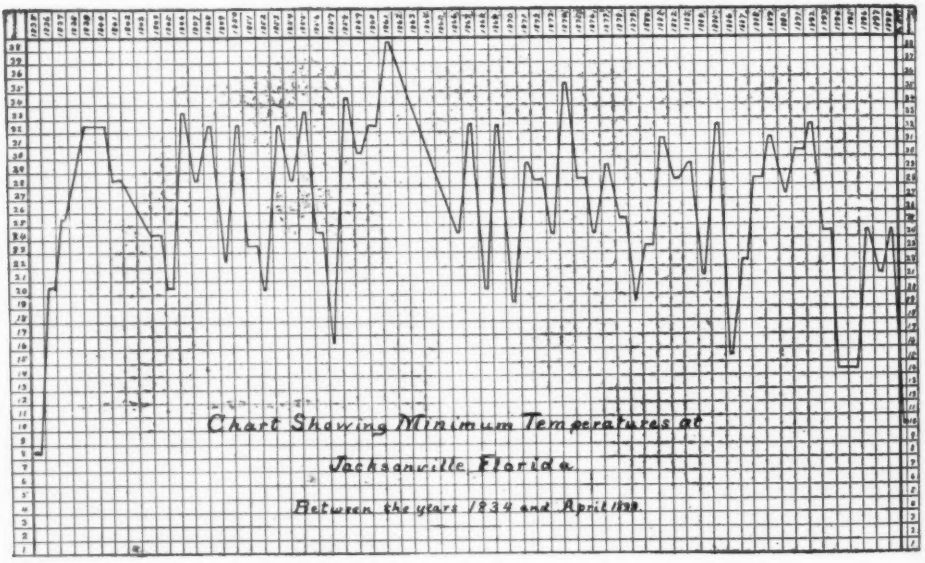
At the annual meeting of our Society in May, 1895, I had the honor of presenting a paper on Florida Freezes for a Century and a Half. A great catastrophe had then recently occurred, with destructive effect upon the orange groves of Florida.

It was a matter of considerable interest to learn, so far as we could ascertain, what had been the previous record of low temperature, in order to draw some conclusions as to the future.

The earliest date of which we have any record, was 1747 when it is recorded that at Charleston, on the 7th of February, the mercury marked 10 degrees above zero, and all the orange trees were killed to the gorund, and doubtless those in Florida were injured. Nineteen years later, in 1766, Bartram, then in Florida, records the occurence of a freeze in January, which killed the lime, citron and banana trees, and many curious evergreens on the St. Johns, which were near twenty years old, which would indicate that an interval of nineteen mild winters had occurred. In 1774, eight years later, a snow storm extended over most of Florida, but no damage ensued, being accompanied with showers. In 1800 the mercury marked 25 degrees which was then regarded as very low temperature, I suppose on account of a long period of mild winters. Prior to 1812 Mr. Zephaniah Kingsley settled on the St. Johns river, and planted out several large orange groves at various points on the river, from St. Nicholas to Drayton Island, and must have had considerable confidence in the orange industry both from information and experience. In 1845 I saw the orange grove planted by him on Drayton Island, the trees of which had attained very great size, and had not been killed by the freeze of 1835. After the change of flags in 1821, success in the cultivation of the orange was regarded as a matter of course, and only received its first rude shock in February 1835, when the temperature at Jacksonville went as low as 8 degrees, destroying the trees down to the ground.

My own personal experience dates back to 1842, seven years after the freeze of 1835. In 1842 many trees at St. Augustine and on the St. Johns had come into bearing, but about that time the scale insect appeared, which was almost as destructive as the freeze. This lasted for a few years, when

with better care and enrichment, the trees resumed their health and vigor, and from 1850 onwards to 1886 no very severe cold weather occurred, although young trees were repeatedly killed down, and between 1845 and 1858 the temperature was twice down to 20 degrees and in 1857 down to 16 degrees. As the trees grew larger they became hardier, and the occasional freezing down of young trees was hardly regarded.




On January 12, 1886, the temperature went down at Jacksonville to 15 degrees; fruit on the trees was of course destroyed, the small trees killed down, and small limbs on the large trees were killed back, but the trees so soon recovered the injury was scarcely felt. Then a period of eight winters elapsed of comparatively moderate weather, when on December 30, 1894 a sudden drop to 14 degrees came, stripping the trees of their leaves and killing back the extremities of limbs. The trees soon revived, started new life and growth, until February 8, 1895, only six weeks later, when the temperature again fell to 14 degrees. Full of sap, devoid of verdure, the blow was fatal, and the trees were generally killed to the ground, except in the lower part of the peninsula. This is the only known instance of two severe freezes in the same winter. Within a few weeks new shoots came out from the trunks near the ground, sour stocks were budded again, and although in each of the three following years, the temperature went below 25 degrees and in January, 1898 the young growth was notably injured, yet still the trees grew on, so that by the 1st of February of the present year, the groves were so far restored as to promise a crop for 1899 of near a million boxes.

Within the first twelve days of last February a blizzard and extreme cold wave

came down from the Rocky Mountains and the cold regions of the North-west, spreading over the Gulf States, driving out the warm air, and spreading a mantle of snow and ice over our semi-tropical clime, and causing nearly every orange tree to perish, as far as it was unprotected, except in the southern part of the State. The mercury went down on February 12th to 10 degrees, almost to the point it had reached in 1835, seventy-five years previously. It will be observed that no cold, however severe, has greatly injured the trees, except the three which have occurred in the first half of February.

Fortunately a large proportion of the groves had been banked around the base of the trees where budded, and thus the bud saved as a starting point of renewal, a saving of at least two years in the renovation of the trees. Already new growth has come out from this part of the tree and shoots now two or more feet long have shown the vitality of the trees, giving promise of an early renewal.

But with our sad experience, we naturally dread the future. Has the climate of Florida changed, and are orange groves no longer safe above 28 degrees of latitude, and must we abandon for the future this most valuable and most delightful industry in the region where it once most flourished?

No reliable prophet can foretell the future of climatic development. We can only forecast on general principles, as derived from past experience. We know that the general range of temperature in certain latitudes is nearly uniform, subject to exceptional variations. If we had the record of temperature for two or three centuries, we would probably be able to arrive at a fair conjecture of probabilities for the future. No brief period of twenty-five years will give any certain data. To aid us as far as possible in arriving at some basis of reasonable conjecture, I have compiled a chart of the minimum temperatures recorded at Jacksonville since the year 1835, some sixty-four years, which if the sheet I have prepared is not sufficiently enlarged to enable you to follow with the eye, can, if you desire, be published in our minutes as a record for future reference. The valuable paper of Observer Mitchell on Climatology will give you scientific facts of great value in connection with this subject, and the head of the Weather Bureau, Mr. Moore, has expressed his conviction that there is no absolute change of climate in Florida existing or likely to exist. I have only to express my individual opinion, an optimistic one it may be deemed, that judging from past records, we are likely to have a milder period of greater or less length during which our orange groves will return to their former prosperous condition, and become more profitable than in the past. We find from our retrospect since 1747 that so far as we know, no destructive freeze occurred for the ensuing 112 years. That for the entire period of 152 years between 1747 and 1899 no destructive freeze occurred in the months of December or January. That we have experienced between 1834 and April, 1899 three destructive freezes, 1835, 1895 and 1899, each of which has occurred within the first half of the month of February. We may also safely infer that if we can retard the ascent of the sap into the trees until the middle of February, so that they will be in as dormant a condition as in December and January, the trees will not be destructively injured by as low a temperature as 14 degrees; whether they would stand 8 degrees we have not sufficient data upon which to predicate with certainty, but

have reason to believe that even at 8 degrees, if the trees are in the same condition as they usually are in December and January the injury they would sustain would be far less than heretofore.

Nature is a great restorer, and a good Providence has always preserved to mankind the blessings which have once been given. Hurricanes, drouths, caterpillars, late and early frosts, disappoint at times the cultivator in the most fruitful lands but he does not therefore despair; so with us, our semi-tropical climate has its advantages in the product of one of the best, if not the best, oranges known to the world, but subject to the vicissitudes common to all pursuits and all times.

The same skies are above us, the same soil is beneath us, and we have only to use all precautions within our power, and patiently bear our occasional misfortunes, grateful for the blessings which we receive, as they are meted out to us by an all wise and all seeing Providence.

## SPRAYING WITH WATER.

**As a Protection Against Cold—Effect on Citrus and Deciduous Trees, Pineapples, Tomatoes, etc.**

A Discussion.

[See minutes, pages 1 to 5; item 15.]

Mr. Hampton: Spraying trees, plants and vines in general for protection from cold has always been a pet theory of mine. "The best laid plans of mice and men gang aft agley." On the strength of that a couple of years ago I went to the expense of several hundred dollars in spraying, so that I have a practical as well as a theoretical knowledge of the subject.

I had some guavas and peach trees. When the thermometer went down to 30 or 31 degrees, I though there might be damage to the guavas, so I resolved to spray them. Had been spraying pineapples. I sprayed them all over with a fine mist, and thought I would spray every guava I had, but got tired, so I thought I would save a few and let the others freeze, and have some anyhow. *Those that I sprayed I lost every plant.* Those which were left alone scarcely lost a twig of the red growth of the guava.

Some of my peach trees were literally lined with fruit, and I wanted to save those peaches. I turned the hose on them and sprayed them, and the sun came out and shone on the glistening leaves, and it was a fine sight. One tree was loaded; I gave it a good dose. Those which were literally coated with ice were ruined from stem to stern; the ones I sprinkled a little have a fair crop of fruit left.

Of tomatoes, I sprinkled all I could

reach. You see I believed in it. I sprinkled them good. Ruined every tomato in reach of the sprinkler. Nothing but the experiment would have satisfied me or succeeded in shaking my belief in its efficacy.

I turned it on a few pineapples. I was very anxious to be sure to save these. They are all right! It cooked them!

I gave some beans a dose of it. Have not had any since.

I turned it on my lime tree—the pride of my eye! It was literally covered with bloom and fruit. I did not want to lose the lime. Just then my wife said she had some good coffee ready for me if I would come in, and I had to change the hose, and it was frozen so that I could not sprinkle the lime tree. The consequence was that the tree passed through the greater freeze safe, with the exception of a couple of feet at the top. (Applause.)

Prof. Stockbridge: I would like to ask the gentlemen if he has stated the entire conditions, how long he sprayed and all about it.

Mr. Hampton: I should think I sprinkled these trees about an hour. I started about five o'clock. Perhaps it was about two hours. I kept spraying them until the sun was at least half an hour high.

Prof. Webber: I hesitate to say anything in regard to the question, because my own experience in that respect has been so limited. One instance which came under my observation was that of the Russell pinery. Perhaps an explanation of the surrounding conditions would modify the results. It is a fact that they sprinkled an area about as large as this room, and they came through in better shape than those which had not been sprinkled. This is the only personal observation I have made.

Prof. Stockbridge: I am very sure that if we got to the bottom of facts in this case, there would be no enigma. Electricity and frost have no vagaries. We must understand the conditions before we can hope to get at the results. The gentleman began spraying at the worst possible condition of the trees. He stopped before he did any good. The medicine might be injurious, but to take it long enough might lead to the full benefit. He did the very worst thing he could possibly do for the tree. Five o'clock in the morning is the coldest moment of the day, and applied at that time the water extracted from the tree what heat it contained itself. He simply cooled the tree.

Dr. Kerr: I agree with Prof. Stockbridge, that the gentleman did not commence spraying at the right time. I would suggest that he commence spraying twelve hours before the freeze and continue it twelve hours after it was over to get any benefit.

H. B. Stevens: In regard to Mr. Russell's experience; he began spraying about six o'clock in the morning and continued all day, covering his plants completely with ice, and they are the best looking plants he has.

F. D .Waite: Mr. Doolittle, of Belleview, Marion county, also protected his trees with tents. I was speaking with him yesterday, and asked him if his tents were covered with ice during Sunday night. He said the ice had formed at 2 A. M., but at 5 o'clock they were perfectly dry. He used common five cent bleaching, and with the aid of common house lamps with a "B" burner and one two-burner oil stove he was able to control the temperature so that when it registered on the outside 12 degrees, on the inside it was 40 degrees, and with a larger blaze he could easily raise it to 60 degrees.

His tents were stretched over light wooden frames and were about ten feet high, four feet at the apex and six to eight feet at the base. Wherever a leaflet or limb touched the tent these limbs were scorched, or frozen back a few inches.

## IS OUR CLIMATE CHANGING?

**The Minimum Temperature of Florida Winters Since 1833.**

Director A. J. Mitchell, United States Weather Bureau, Jacksonville Section.

[See minutes, pages 1 to 5; item 22.]

Mr. President, Ladies and Gentlemen—The question, Is Our Climate Changing? is a pertinent one, and deserves a careful examination of all data. However, the data showing there has been no material departure from an accepted normal will not meet all demands, for the reason that it is possible to have an extremely low temperature, such as the record of 10 degrees in this city during February of the current year, yet the average temperature for the year may not indicate that such conditions prevailed—due to the possible abnormal warmth during other months.

As a matter of fact, the question of prime import to us is not to be found exclusively in examining average temperatures, for it is important that we should not overlook the frequency of severe cold waves; hence, it is obvious that we should study minima temperatures and their frequency of extreme fluctuation.

With this purpose in view, we have tabulated all available minima data for the three months of greatest cold, January, February and December.

Excepting the period of our Civil War (1861 to 1865), the record is fairly connected—from 1835 to 1899—quite sixty-four years. It will be appropriate to add, however that maximum and minimum instruments were not used previous to 1874, the lowest readings being those indicated, as a rule, at 7 A. M. observation. Examining the annual minima temperatures, beginning with 1835, we find that the coldest weather ever experienced in this State occurred in February, and to this fact can be largely attributed the resulting enormous damages. A visitation of the same degree of cold in December or January would be of less consequence for the reason that citrus trees would not be so susceptible to damage.

With regard to the lowest annual temperatures since 1835, an examination of the charted data reveals no uniform decline. No cycle of changes can be detected, and we have as much authority for asserting that the sixty years preceding 1835 were characterized by unusual warmth as to conclude that they were punctured at frequent intervals by destructive cold waves.

### FEBRUARY DOES THE MOST MISCHIEF.

It is accepted that the coldest weather ever known in Florida occurred on Febru-

ary 8, 1835, and February 13, 1899, the former date giving a temperature of 8 degrees above zero and the latter 10 degrees above.

As citrus trees can survive a temperature of 20 degrees, we find that during the sixty-four years there have been eleven instances when that degree of cold was reached, and six of these occurred previous to 1872. In other words, 17 per cent. of our winters over northern Florida, since 1835, have been such as to endanger the orange industry.

We find that the temperature reached 20 degrees only twice between 1839 and 1856, a period of seventeen years. Then followed a cold year—16 degrees—in 1857.

As our coldest weather occurred in February, it is of interest to know its percentage of frequency when compared with the other months, January and December. We find the percentage to be, January 48 per cent., February 11 per cent., and December 41 per cent.

As stated, excepting 1857, when the temperature fell to 16 degrees in January, no extremely low temperature was recorded until 1868 and 1870, when the record 20 and 19 degrees, respectively, was made in December. From 1870 to 1879 inclusive, the lowest temperature experienced was 24 degrees. Then followed years of low temperature as indicated by 19 degrees in December of 1880, 21 degrees in 1884 and 15 degrees in 1886. A succession of warm winters then followed, which in turn were succeeded by a temperature of 14 degrees in December, 1894, the lowest for fifty-nine years.

Although many emerged from the disasters of 1894 and 1895 bereft of fortune and estate, there was yet that "Hope that springs eternal in the human breast," of possible exemption from such fatalities for many years. But our fondest hopes were mere dreams of fancy, and the 13th of February, 1899, marked another epoch in the climatic history of Florida.

What inferences can be drawn from the facts before us? We say, without hesitation, that the only conclusion apparent to us is that the cold of February, 1899, was simply a case of climatic history repeating itself, for just sixty-four years and five days previous the same degree of cold, practically, enveloped Florida.

### NO REVOLUTION HAS TAKEN PLACE.

In support of the assertion that no revolution has taken place in the climate of Florida, the temperature data of the Jacksonville station for February have been selected for examination. The average temperature for February from 1839 to 1856 was 56 degrees. From 1872 to 1899 58.1 degrees. The average temperature from 1839 to 1899 was 58.9 degrees. The established normal for the month of February is 58.4 degrees, showing, instead of a deficiency, an excess in heat of 0.5 of a degree. We have made a distinction in the data for the reason that the records used from 1839 to 1856 were compiled by the late Dr. A. S. Baldwin, whom we know to have been a careful observer. From 1872 to 1899 are compilations of the Weather Bureau. In accepting these figures, it is well to state that changes in exposure of instruments, elevation above ground and freedom from radiated and reflected heat are all sources of error, and if each were allowed a proper correction, there might be, possibly, a slight change in the general average.

Again, discussing February data, we find that the mean temperature for that month in 1895 was 47.6 degrees. The same month

in 1899 was 58.4 degrees. So we see, while February, 1899, gave us a minimum temperature of 4 degrees lower than February 1895, the monthly temperature of February, 1899, averaged 7.8 degrees higher, apparently emphasizing the fact that these anti-periodical cold waves are of a fortuitous nature. Making further comparisons between February, 1895 and 1899, we find the former closed with a deficiency in heat of 341 degrees, while the same month of 1899 gave a deficiency of only 88 degrees. These facts may throw some light on the resulting damage to citrus trees.

### ANNUAL MEAN TEMPERATURE IS NOT CHANGING.

Taking a broader view of the situation, we find that since a weather station was established in Jacksonville, only about 20 per cent. of the years have given a temperature decidedly below the annual normal, and that the annual temperature was a degree or more above the normal in 1894 and 1895, years noted as giving minimum temperatures of 14 degrees.

It appears there is not the slightest relation between years of decidedly low minimum temperatures and the annual mean temperatures for the same period. For instance, the annual mean temperature for 1886 was about 1 degree below the normal, with a minimum for the year of 15 degrees. In 1894-95 the annual mean temperature was about 1 degree above the normal, with a minimum of 1 degree lower than the record of 1886. Again, in 1880, with a minimum of 19 degrees the annual mean temperature was a degree and a half above the normal.

The only pertinent fact which I can gather from the charted data is that when the annual mean temperature once rises above or falls below the normal, it will remain so for five or six years. The fact that the annual mean is above the normal gives no assurance ,however, that severe freezes will not follow, for there has been an excess in heat for the past ten years, as indicated by the annual mean temperature, yet the severe freezes of 1894-95-99 took place.

In his climatology of the United States (1857), Lorin Blodgett gives the following temperature data for Jacksonville on Sunday, February 8, 1835:

7. a. m., 8 degrees; 8 a. m., 12 degrees; 9 a. m., 14 degrees; 10 a. m., 20 degrees.

February 9—7 a. m., 14 degrees; 8 a. m., 20 degrees; 9 a. m., 24 degrees; 10 a. m., 32 degrees. For comparative purposes we give data for February 13, 1899: 7 a. m., 10 degrees; 8 a. m., 12 degrees; 9 a. m., 15 degrees; 10 a. m., 18 degrees.

Referring to the effects of the cold of 1835, the following comment was made:

"Evergreen oaks shed their leaves; orange trees were split to the roots, and, of course, were killed, roots and all."

Regarding these old records, we note that one day in January, 1852, "snow fell all the morning," and in February, 1855, "snow fell on the 27th."

The lowest temperature at Jacksonville during March, since 1872, was 26 degrees, during the current year. We find that on the 3rd of March, 1833, ice formed in this vicinity, showing practically the same degree of cold.

With regard to the conditions contributing to the formation of these severe cold waves, it is unnecessary to speak. I may say that the best thought of the day is against the idea of climatic change.

We are willing to accord man great credit for his masterly strides during the past half century, but we can conceive of no act on his part whereby will result a perma-

nent change in the effects of solar energy upon our planet.

To admit that the clearing of forests, for instance, affects our climate, would be placing in the hands of man the destiny of sections, states, countries and nations. While we admit that the effect of deforestation upon climate may be an open question, we accept the remarks of Professor Moore, who said: "Broadly speaking, the variation of insolation from day to night and from season to season, with changing declination of the sun, is the greatest controlling agent of climate."

The destructive cold waves which sweep with such rapidity from the north-west to the south-east cannot be foretold exceeding seventy-two hours, and then only after their appearance within our field of observation. We have yet to learn many things concerning the mechanics of storm formation, both cyclonic and anti-cyclonic. As to the origin of the severe cold waves, we know they result from a shifting of the earth's atmosphere, which piles up, so to speak, great pressure areas over the continental northwest, resulting in the winds blowing from a colder area toward a section of higher temperature; in other words, from sections where the barometer is high toward areas of low pressure.

In these storms which we designate as anti-cyclonic the cold air is thrown off from the center or crest of the high pressure in all directions, as the storm moves easterly in keeping with the rotation of the earth. Experience has taught us that, with an extended area of high pressure over the north-west, a very feeble Gulf storm will greatly augment the effects of even a moderate cold wave over the South Atlantic. These were the conditions last February, resulting in the phenomenally cold weather.

We know that storms form at an elevation considerably above us, and if the time arrives when we shall be able to chart the great aerial ocean, our percentage of verifications shall receive a decided impetus.

Viewing matters as they present themselves, we find that destructive cold waves have recurred within the short space of four years (February, 1895 to February, 1899), and that the longest period of immunity has been less than twenty years. With these facts before us, it would seem the work of supererogation to admonish you to prepare for possible contingencies. Disasters and calamities are neither averted nor ameliorated by putting too much reliance in hope, and taking exuberant views of a situation, when any winter may bring trouble.

Realizing, then, the dangers which threaten, it behooves us to address ourselves to those methods of protection which offer the greatest safety.

As a guide, we have the results and experiences of our enterprising competitors in California. They have pursued the question with diligence and intelligence.

A recent pamphlet issued by the Weather Bureau, many of you receiving copies through the Weather Bureau office in this city, gives valuable information. Five methods are given therein whereby frost formation is prevented or damage mitigated. To discuss each head, even briefly, would consume too much time.

### TEMPERATURE LESS IMPORTANT THAN RAINFALL.

We know that invidious comparisons are not in the best taste, but they are necessary at times, to impress us with our own good

fortune. We have had freezes, the damages from which have been co-extensive with the domains of the State, but I wish to impress upon you the fact that the question of temperature is of less importance than any other factor or element entering into a discussion of successful agriculture or horticulture. The dominating, essential and vital requisite is the matter of rainfall. This we generally have in seasonal sufficiency for all crops, and this great positive factor makes Florida conspicuous as a place where total crop failures are unknown.

The exactness of astronomy yielded to man's cunning, after ceaseless vigil and tireless effort. Franklin snatched the lightning from the heavens by long investigation and intelligent research. Edison encompassed the electric current after profound study and unflagging zeal, and may we not hope some day to discover the secret of present meteorological mysteries? What a grand achievement it would be, with the dawn of the twentieth century, if it were possible to announce that meteorology were progressing favorably toward a degree of exactness; that many of the present tantalizing enigmas with which we have to contend in forecasting are laid bare, and the husbandman could proceed to the field and grove with well-founded assurances as to the character of weather which the week, month or year held in store.

What would it mean?

Echo answers, a thousandfold increase in human happiness, and a corresponding reduction in human misery.

## DISCUSSION.

[See minutes, pages 1 to 5; item 23.]

Mr. McCarty: I would like to ask whether, dividing the chart into two halves, does not the right hand half show a lower temperature than the left half?

Director Mitchell: Remember that official records commenced in 1872. But admit that as true, you see there were irregularities. In 1885 we hardly had any frost at all. In 1874, 35 degrees and no frost in northern Florida. In 1880, 19 degrees. So there is absolutely no uniformity, we might say, if the chart shows irregularities, they are antiperiodical though progressive. In 1886 we had 15 degrees. The next year was the best orange year we had. In 1887, 22 degrees. From 1874 to 1879 we had another warm season. No frost in 1874 in northern Florida, nor in '69 and '70. Comparing the cold years with the warm years, there is a variation of about 2 degrees, on the average.

Mr. McCarty: Is it safe to assume that we will have several years of abnormal temperature?

Director Mitchell: The only information we have is indicated by the figures. I think you will find (but I don't say it as official), that there is an interval of about seventeen years between these periods of cold weather. Our lowest temperature was in 1835 and in 1899.

Director Mitchell: Captain Richards, when were your pineapples frosted?

Captain Richards: We never had any frost.

Director Mitchell: We did not have any official records down there then, that is the reason you had no frost. (Applause.)

## SHEDDING FOR ORANGE GROVES.

**It Would Probably be a Profitable Investment.**

By H. B. Stevens, of Citra, member of the Standing Committee.

[See minutes, pages 1 to 5; item 24.]

Mr. President, Ladies and Gentlemen—So much has been presented to this Society on the subject of citrus fruits that there is little left to say on that subject, which is not a repetition, and, in the light of recent experience, the important question now confronting us is: How are we to successfully and safely raise citrus fruits?

It is getting very monotonous to care for our trees all the year, only to see them cut down by cold, just when we thought they were going to put on a crop; and with many of us this repeated occurence has so far exhausted our means that we are not able to continue the expensive and hazardous efforts any longer; and the only thing that has any charm for us now is some means that promises beyond doubt, to give us sure results.

From what we have been able to observe of the different experiments tried during the late blizzard, the only safe plan is a close, substantial shed, well fired.

It was our privilege to visit the shedded grove of Mr. H. Lubrecht, of Island Grove, and, although the mercury went to 9 degrees outside, not a tree was injured in his shed. He informed us that in his grove, outside of the shed, he had a large fire to every tree, and that he raised the temperature 7 degrees, but that only brought it to sixteen, and did not save his trees; while in his shed, with only a boy to keep up the fires, the temperature went to 60 degrees.

Now, the question no doubt presents itself to you, what will this shed cost? That will depend on what you pay for lumber, and the height you make your shed. At the price lumber can be had for in this section you can build a shed fifteen feet high for less than $800 per acre. This looks expensive, and so it is, if you leave your trees at the same distance apart as is customary in open groves; but suppose you put a grape fruit tree in the center of each square, and a tangerine between each tree in the rows; this will give you 289 trees, or three and a half acres of trees to one acre of shed, and these trees can stand thus close together for a number of years.

Your shed will cost, with the interest for five years, $1,040 for one acre of shed, but you will have protected three and one-half acres of trees, so that your protection only costs you a little more than $59 for an acre of trees per year, aside from your fuel and

labor. Taking Mr. Lubrecht's experience as a basis, six cords of wood will answer for one acre, for a winter as cold as the past one.

Now, we have considered the cost of the protection, let us look at what we may reasonably expect from an acre so planted and protected, during the first five years. We must take into consideration, in the first place, that if we have gone to so much expense for protection, we will take pains to fill our shed with the best varieties of trees, and will give them the best of care, so we ought to expect better results than from the trees cared for in the old way. We will suppose that the trees are budded this spring, so we do not expect any fruit until the fall of 1903, when they will be three years old, and should average twenty-five oranges to the orange tree, and ten grape fruits to each grape fruit tree. Hence there will be for the crop of one acre, the third year, 13½ boxes of oranges, 24 boxes of tangerines, and 10 2-3 boxes of grape fruit. The fourth year we ought to get 75 oranges, 150 tangerines, and 40 grape fruit to the tree, or 40½ boxes of oranges, 72 boxes of tangerines, and 51 boxes of grape fruit. The fifth year we ought to expect one box of oranges and tangerines each to the tree, and two boxes of grape fruit to the tree. This means, at the prices obtained for such fruit, the past winter (and not at the highest prices either) over $300 for the third year's crop, $1,063 for the fourth year's crop, and $2,309 for the fifth year's crop, making $3,672 that your acre of shed has earned you in five years. You are now in a position to enlarge your shed, and take out your tangerine trees, and let the other trees have the room.

Now, that we have learned that it is the part of wisdom to shed a small grove, we want to do it after the most approved manner, and we will say that the plan that commends itself to us is the invention of Mr. J. H. Stevens, of Dayton, O., a member of the Clifford Orange Co. His shed combines cheapness with simplicity, and while letting in all the sunshine and rain, can be quickly and tightly closed. He has applied for a patent for his shed, not so much to make money out of us growers as to protect himself from anyone else who might happen to hit upon a similar plan.

He offers to furnish each grower desiring to put up a shed the plans and specifications for so much per acre, together with plans for the most economical method of heating.

# RESTORING FROZEN TREES.

**A Practical Plan Based on Experience.**

John J. Beers, Emporia, of the Standing Committee.

[See minutes, pages 1 to 5; item 24.]

Mr. President, and Members of the Florida State Horticultural Society—"Before the freeze," we date everything pertaining to growing of citrus fruits from that nowadays; we could talk of when and how to cultivate, fertilize, spray, and generally handle our groves to produce the most and best fruit; but what is there to talk of now but how to rebuild those once fruitful groves? And surely this is an important subject for we don't want to leave those who come after us so much in the dark if they should be frozen out as we were. We were getting along so nicely that I had begun to flatter myself that such a thing could never happen again; but after the 13th of last February I thought of the wisdom of the dear old widow Bedott when she said: "What pore short sighted things we be,

For we can't kalkulate
With no degree of sertanty
What's a coming and what ain't."

Groves in different localities have to be handled so differently that I wish to say, to begin with, that what I write is the result of experience and observation in groves on high pine, sandy soil.

First of all, contrary to the advice several times given here, I would not cut down my trees until I could be sure that I was not cutting anything that was good; and even when I knew that they were dead to the ground I would cut them wherever it came handiest. The dead stump will soon decay and can be broken off. I would clear away the earth from the collar of the tree but not too much, and would allow only those sprouts to grow which would number from three on trees four inches in diameter (I think all smaller than this should have been grafted) to twelve or fifteen where trees are large and frozen low enough to sever connection between the main collar roots. I would select a sprout growing on top of some large collar root instead of one from the valley between two such roots, as was often advised shortly after the freeze.

I would do my first budding the first fall and would make an effort to get them all budded at this time, though if banking is to be the mode of protection from cold that winter it will be necessary to stop budding early enough to allow buds to set before banking.

Those that I do not get budded in the fall should be worked the following spring and

every effort made to get buds in while sprouts are small, as we have experienced a great deal of trouble in getting buds to take in sprouts over one inch in diameter, especially with the immature budwood which we are obliged to use.

As to time for budding, we prefer the middle of September to the middle of November for dormant buds, though some of the earliest ones will start. In the spring we would cut the sprout off close to the bud. For spring budding, March and April are the best time, going over the work every ten to twelve days to rebud where buds have died, and cut off sprouts where buds are alive. We have not had much success budding in May, but rains come in June, and then buds take well until early in July, when they begin to bleed badly and we have had bad sores and some dead sprouts as a result of budding or cutting of any kind from the early part of July to the middle of September.

As soon as buds are large enough I would allow other sprouts to come so as to have two or three to inarch into each bud to strengthen the bud and also to take sap from as many different points as possible. Where sprouts come from above the point where the old tree was budded I would allow several sprouts to grow from below or from the opposite side and inarch them into the sweet sprouts, but would try to save only those which show thrift and abundant vitality. Under no circumstances would I bud into sprouts which come from the side of the stump above the ground, and in all cases bud at or below the natural level of the ground.

I would use fertilizer very sparingly for a year or two, but would keep up rapid, shallow cultivation in dry weather and keep the ground clean around the trees, or, better, cultivate a strip around the tree row in the rainy season.

I believe the best and most enonomical way to fertilize is to sow cow peas or some other legume with a light dressing of acid phosphate and sulphate of potash; and I hope to make crimson clover grow in the winter which will improve the ground and may help to keep trees dormant a little later in the spring.

## CITRUS FRUITS.

Irving Keck, Bowling Green, of the Standing Committee.

[See minutes, pages 1 to 5; item 24.]

The past year has seen another trying time for the citrus family. The cold in this locality marked 20 degrees on February 13th. Some trees were in bloom, and where they had not bloomed and were not fired they have failed to put on bloom; but where they were fired judiciously they have set a good crop of fruit. Many of the young groves in this vicinity have been entirely abandoned. The old groves lost no wood this year, but shed their leaves quite generally.

Trifoliate stock, where tried, has gone through in good shape; never, so far as I

have observed, even shed the leaves. The objection is, dwarfing the trees; but a portion of the grove should be on trifoliate.

Banking has invariably saved the buds and those budding now are budding very low. I feel quite sure that those of us having groves on medium flatwoods land made a mistake in removing the timber from our groves. It is probable that windbreaks of cedar would materially help our groves, planting, say, double rows of cedar eight feet apart and four feet in the row, say every eight to ten rods apart through the grove.

Where trees have been trained with high bodies whitewash to protect the trunks from the force of the afternoon sun might be of decided help. Some experiments made on peach trees in Missouri indicate a difference of about ten degrees in favor of the whitewashed trees. The action of the lime is to free the trunks from scale, moss, etc. The objection, and the only one so far as I know is, it has a harsh effect on the eye. That might be relieved by adding some coloring to the whitewash, but that to quite an extent would defeat the object of the whitewash..

Respectfully submitted.

## TENT PROTECTION FOR ORANGE TREES.

By C. A. Bacon, Ormond.

[See minutes, pages 1 to 5; item 16.]

Mr. John Milligan, of Sioux City, Iowa, has a grove of five acres in low hammock at Ormond. Last fall 1898, he brought down 125 one burner kerosene oil stoves and 2,600 yards of muslin, and made tents or covers for 130 trees from four to eighteen feet high. Cost of stoves, 35 cents each; cost to cover a tree (including stove) fifteen feet high, about $3.

In covering the trees he first draws the outer limbs in toward the trunk with a single block and cord and ties them. Then he makes a square frame of box sides and lays on the top of the trees and puts the tent or cover over that. Next season he says he will have center poles to hold the frames up. His tents come well down on the ground, and he puts earth on the bottom.

On the morning of February 13th when the temperature reached 30 degrees he fired up. After his fires were lit he sprayed water on his tents, and formed a coating of ice one-sixteenth inch thick.

When the temperature reached the lowest point, 13 degrees outside, the temperature inside was from 12 degrees to 16 degrees higher. His oranges were not frosted, the tender growth not killed, and the leaves did not drop. He had five trees with tents and no stoves; the temperature inside of them was from 2 degrees to 5 degrees higher. Trees lost leaves and tender growth.

We visited the grove March 9th when these notes were taken. The tents were still over the trees, and we saw no sign of bloom. One hundred stoves burned thirty gallons of oil in ten hours. I think he had five men to assist him.

Mr. Milligan is pleased with the result of

his experiment, and will bring more stoves and cloth another season.

We visited the grove again April 26th, and found the trees in a perfect normal condition; no dead wood, full of foliage, dark green and glossy, but very little fruit. We did not examine closely, but the proprietor said there was "some fruit." On this same day we visited Mr. Lewis' grove. During the freeze of the 13th he had canvas around his trees, and not covered over the tops; had two burner stoves inside. Trees dropped all their leaves and last year's growth was killed. Trees look in fine condition now. Trees near by not protected in this way were killed to the ground.

DISCUSSION.

Mr. Hampton: I would like to know if any one has tried covering young trees with Spanish moss. I tried it this spring on trees put out this spring and some, one and two years old. I left it on from December until spring, until we thought the cold had gone by. I am going to try this plan this spring on some young grape fruit trees. If any one has done so, I would like to know what success they had.

Mr. Waite: The manager of the Tillson grove at Orange Bend uses tons of that moss every year for protecting the orange trees there, and in ordinary winters, I suppose down to 26 degrees, it is a success, but this winter the trees were killed. I myself wrapped one-year-old trees in moss, and down to 28 degrees I saved them. In the spring after they stopped growing, I shielded them from the sun. It is all right for the frost, but not for the freeze.

Mr. Hubbard: I had a little experience in 1895. Had fifty buds put out in 1894 which were in growing condition in December, and I banked them from eighteen inches to two feet and put a small forkful of mulch in the branches. In the freeze of December very little injury was sustained, but in February, 1895, it killed every one of them.

Mr. Mann: Mr. Hastings, tell us, if you can, something about Mr. Francis protecting trees with oak leaves.

Mr. Hastings: Very disastrous. He closed in the tops of his orange trees with oak brush, saplings, and some with pine tops. The reason for it was that, while it was a protection from cold, there was a week of warm weather, and in that time there was a kind of smothering process inside this covering which killed the trees back. Wherever the tree extended beyond this covering it was all right. In some cases the wood died.

Mr. Bacon: I would like to ask Mr. Kinney what his experience has been this winter. If Mr. Kinney is not present, Dr. Kerr could tell us.

Dr. Kerr: A number of members have spoken to me in regard to Mr. Kinney's grove. I would say that Mr. Kinney is here but is unable to be present with us; he is in quite a weak condition. He, however, requested me to make the following report: That in the old grove around his house, which contains about 200 trees, all of his trees were saved. Some of these trees antedated the freeze of 1894-95. The new growth was injured, but some of the trees bloomed. He lost about 200 boxes of oranges. Mr. Kinney had the utmost confidence in his method of being able to save fruit and blossoms, regardless of anything he had seen in Florida, and when this tempest came upon him like a thief in the night —not that he was unprepared for it, for everything was ready, and the men got to

work quickly—he said burning ice in a gale was a thing he was not ready for.

Much of his tangerine grove was destroyed because he did not get his fires ready in time. The nursery stock is all right. Some of his lemons had fruit. Practically his fires saved three or four acres of fruit. He expects more bloom in June. His trees look fine.

Mr. Hart: I am glad to hear the report of Mr. Stevens in regard to the shedding. About the cost of the shed: I believe Mr. Stevens knows about as much about shedding orange groves as any one in the State, but I was surprised to hear the estimate he made of the cost, and I would like to ask him if that estimate covered a complete and solid cover of all wood or if there was wire used?

Mr. Stevens: Completely covered with wood. Shed tight like a box. Fifteen feet high. Not a pinery shed, but an orange tree shed . It can be moved without any trouble except jacking it up.

Mr .Hart: If it was tight and all wood, I should judge the estimate was pretty low. But I have just been covering a grove with laths woven into wire cables which gives a half shade. About half is of one and a half inch openings between one and a half inch laths, and the rest of three inch openings and three inch laths. About half of the latter are thoroughly saturated with creosote oil.

All of my posts are creosoted below ground. I used 1x6 cypress boards one way and wire the other way to support the roof. Wherever any wood comes together I have it creosoted. Posts of cypress, a part cut green, peeled and dried, the rest of dead hearts brought from the swamp, such as they use in Orlando. Heaviest wire is No. 8, used over the lines of posts. The rest of the supporting wire is No. 9. The wire that I wove my lath with is No. 14. Just before leaving home, not having but a moment to give to it, I ran together a few figures from my check book and bills, and as near as I can estimate, that grove covering cost me $450 an acre.

A Member: What kind of walls?

Mr. Hart: A tight wall, eight feet high, of eight foot laths 3-8x3 inches woven into wire so as to leave no openings between on the north and west; and east and south side covering like the top.

Question: How high is the shed?

Mr. Hart: Fifteen to sixteen feet. Longest posts eighteen feet set three feet in the ground for outside. I ran several lines of posts seventeen feet long through the shed. The intermediate posts are sixteen feet and go into the ground very little. The distance between the posts is eleven feet, six and two-thirds inches. Trees are twenty feet apart one way and fifteen feet the other, set quincunx.

# EFFECT OF SHADE.

**Influence of Sheds and Shade on Quantity of Bloom—On Quantity of Fruit.**

## A Discussion.

[See minutes, pages 1 to 5; item 26.]

Mr. Bacon: What are you going to do with the trees after we have them all fired up and banked up, if they won't bloom? I would like to ask—perhaps Profs. Webber and Stockbridge can tell us—if it is not a fact that if you cover your trees, as no doubt a majority think they must be, until the 1st of March, they are not going to bloom, until the 1st of March, only scattering, after which we have June bloom alone, which I count as being worth very little. I would like to ask the professors if it is not a fact that covering will prevent bloom?

Mr. Stevens: I think the gentleman misunderstood the paper I read. The arrangement of which I spoke can be opened and closed at will; opened in a very few minutes and closed in a very few minutes. It receives all the sun and rain. This side wall is lumber trussed and ship lapped. I find from experimenting with pineapples that it pays to have these cracks closed.

Mr. Painter: Early in February I had bloom under my tents and a good many oranges as big as my little finger. The tents had been over the trees since last December.

Mr. Hampton: In 1895 I had some pawpaw trees that were full of fruit. I had no tent, so I went to the house and stripped the beds of sheets, gathered them up and put them over a pawpaw tree and set a kerosene lamp under it and went to bed and went to sleep. As a consequence in the morning it was not frozen down. I had the pleasure of eating the fruit.

Mr. Neeld: I make the point, that where the trees have been killed down several times the wood of these roots will never amount to anything.

Prof. Stockbridge: We had a little experience at the Experiment Station. We have no orange trees but we have a shed and under the shed we had blooms. Our shed is about the size of this room, and we used it for strawberries. Of course it was frozen tight in February but we can judge what the influence was of shed or shade. Shade reduced the amount of bloom, but I don't know if it has reduced the total crop of strawberries, but there is no question but that the bed outside of the shed has had more blooms and more fruit than those planted at the same time under the shed.

Mr. Painter: Possibly Mr. Sampson can give us some information in regard to the effects of shade on orange trees. We all know that wild orange trees which have

been converted to sweet grow in dense hammocks, and I have been in some where the shade was almost as dense as in a pineapple shed.

Mr. Sampson: My results under frost protection have not been as good as in the open.

Mr. Hart: I note what Mr. Painter has said in regard to fruit under overhanging trees down on the East Coast. I don't know if there is as much bloom on the trees as there would have been on the outside, but the trees have a good deal more bloom, in my judgment, than is good for them if all of the energies of the trees run to bloom and this is thrown away. Under the trees there in our hammocks we have had good crops. But these trees had to compete with the roots of the wild trees; they had an immense competition. They were covered over with competitors. Roots of trees several times as large as the orange trees were competing with them for the soil, and yet we had fair crops. In the shed there is none of this competition, the orange trees have cleared ground to work on. Everything in the ground is subservient to them.

Orange trees seem to feel the effect of palmetto trees in the way of protection wonderfully. If you have a grove which is partly cut down to the ground, and there are in that grove several large trees which bear a few boxes, they are under palmetto trees. The same conditions prevail in all groves where palmetto trees are grown. While palmetto trees do not draw much soil moisture from the orange, there is a dropping of trash which falls on the tree below and causes scale to breed there, and a large proportion of the orange trees under these palmetto trees are in a very bad shape on this account. It does not seem to me that the sheds have that trouble. My experience, however, is largely ahead of me rather than back of me.

As to trees which have been cut back a good deal but not killed, I think they are not so good as sound trees. Yet some of them may be made to be profitable. The old wild groves on the East Coast are good groves, though they have been cut back. There are wild groves from trees which have grown from stumps dug up out of the hammocks, dug up and set into groves, and they made good groves.

Mr. Neeld: In many cases I think it would probably be better to dig these old roots of trees which have been repeatedly killed and and set out small trees. As an evidence of this, I have noticed old trees being set out, large trees, fifteen or twenty years old, and small trees, and the small trees would make the best tree, and make it in just about the same time.

### FRUIT INSIDE OF TREE.

Mr. Painter: In regard to the qualities of fruit from the inside and outside of the tree, when I was interested in getting a fruit which would be attractive to the eye and pleasing to the taste, I always went to the inside of the tree. That was my personal experience.

At the Ocala Exposition I was one of the judges of citrus fruit, and it fell to the lot of my friend, Rev. Lyman Phelps, to receive the premium for having the best display. I hold in my hand here a medal awarded to Mr. Phelps for that display. I am informed by Mr. Phelps that the fruit was taken from the inside of the tree, but the committee had no knowledge as to who furnished the fruit or where it came from. I take this medal as evidence enough that the fruit on the inside was the best.

Mr. Bacon: Especially when the fruit on the outside is rusty.

Mr. Phelps: The fact is that the fruit on the outside is rusty. The color is not as deep, and you cannot put up an exhibit of fruit from the outside of a tree as well as from the inside. I always went to the north side or the inside of the tree for good fruit. I learned that in the early days. In Orlando I made an exhibit, in which the display was perfect, all the colors harmonizing. The most beautiful fruit we have had in Florida has been grown on the inside of the tree.

I have never set out a lateral root which in three years did not send out a tap root. In 1895 I set out seventy-five lateral roots, which were about six or seven inches long. Every one of them grew.

I am as emphatic today as when I formerly made exhibits every year, and when there was plenty of oranges, to say that the best and highest priced fruit is the fruit taken from the inside of the tree.

Mr. Hart: I made a statement on that line some time ago which has been called into question by quite a number and caused surprise to a good many others. But I was very sure of the ground I was on, and have stuck to it always and expect to always. I would like others to state their experiences in regard to the question as to whether the best fruit is on the inside or on the outside. Really, it seems to me there is some misunderstanding about it, and I would like to have it established or refuted. I have been here in Florida twenty-four years tomorrow, and have had some experience with oranges and have been among them all the time, and it always appeared to me that the poorest, roughest fruit got to the top.

Mr. Butler: Mr. Hart speaks of the coarsest oranges being at the top of the tree, but there is one reason for it and that is the extreme sunshine.

But in regard to the orange not having so much sun, the tangerine on the north side of the tree is worth more than on the south side. So much so that I always have shade on the south side from June to February. But the mango grown in the sunshine is worth more than those grown in the shade. Grown in the shade it is insipid. In regard to citrus fruits, I think many of them would be improved by one-half shade.

## THE PATRIC DEVICE FOR PROTECTION OF ORANGE TREES.

**A Cylinder Inclosing the Tree—A Small Heater at the Bottom—Illustrated.**

Paper by H. G. Hastings, of Interlachen.

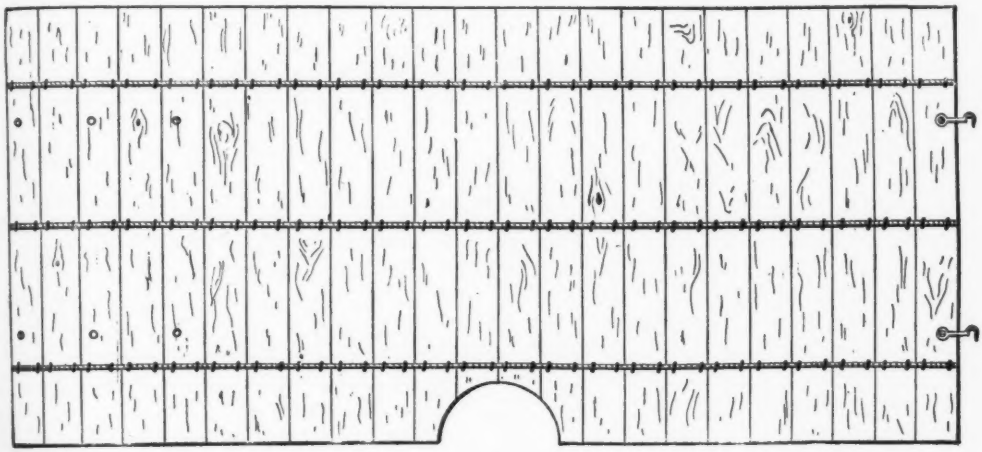
[See minutes, pages 1 to 5, item 29.]

This past winter has brought the subject of protection to our trees home to us very forcibly. Many devices have been advocated that are more or less practicable. Shedding is one of them, but the initial expense of shedding (from $500 to $800 per acre) is too heavy to be borne by the great majority of orange growers.

My attention was recently called to a protector devised by Mr. Lewis Patric, of

Interlachen, which, I believe, will give all the protection that a shed will during the periods of extreme cold and at the same time last longer and can be had for one-fourth the expense of the shed.

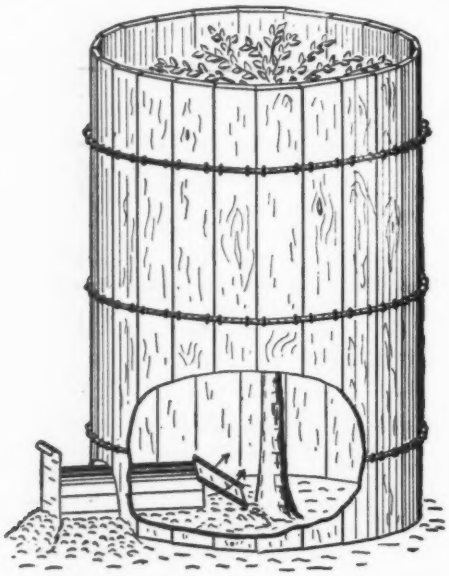
It is a wooden cylinder constructed of thin slats of lumber about six inches wide, the cheaper grades of cypress being preferable. Its height and diameter can be made according to the size of the tree, and the diameter can be increased at any time by the addition of more slats. These slats are fastened together by ropes that can be made almost impervious to the action of the weather. When drawn around the tree in cylindrical shape the cracks between the slats are closed.



At the base a small arch is cut as shown in Illustration No. 1. Into this arch is inserted a little sheet-iron furnace in which fire is made, the wood of the cylinder being protected by a strip of asbestos. This furnace has a damper or door of sheet-iron on the outside, also a sheet to place over the end of the furnace next to the body of the tree; and this sheet of iron has sand piled on it, being a protection to the body of the tree from the direct fire in the furnace. The sand on it acts as a reservoir of heat which will be constantly thrown off and ascend up through the branches of the tree. These features are shown in Illustration No. 2.

The cylinders are placed around the trees when the season for dangerous cold comes. It is not necessary that they be drawn up closely until the actual cold is at hand, as one man could draw the ends together and fasten them with the hooks in a very short time. The wood for use in these small furnaces is distributed and placed inside of the furnace at the time the cylinders are put in place, thus insuring dry wood when the time comes to light them. As soon as the wood is well ablaze the damper is placed against the outside of the furnace and the draught shut off almost entirely, thus giving a slow steady heat, all of which is available, being confined in the cylinder, until it passes out of the top. The top being left

open, the heat passing up through the cylinder is sufficient to protect the few branches that may be exposed at the top. With the slow draught the consumption of fuel is reduced to a minimum. In an experiment made by Mr. Patric recently a few sticks of kitchen stove wood raised the temperature inside of the cylinder an average of 20 degrees for five hours. In practical use the fires will not have to be replenished



more than once in every four or five hours.

I have no interest in this matter beyond bringing before the members of the Society what seems to me a practical device that is within the reach of us who are unable to stand the initial expense of shedding, and who do not want our trees covered the year round. These cylinders, being light and easily handled, can be stored away in comparatively small space and protected from the weather as soon as the danger from cold has passed. The removal of the cylinders in the spring leaves our ground clear and cultivation of the trees can go on in the usual manner.

I am sorry that Mr. Patric is unable to be here, as he expected to be, as he would doubtless cover the subject to better advantag than myself.

The question of cost is an important one. Mr. Patric tells me that the device can be manufactured complete, cylinder and furnace, in sizes of seven feet diameter and ten feet high, at $2.25 each. This would make the expense of the protection of the trees approximately $150 per acre, about one-fourth of the expense of the average shed.

DISCUSSION.

Prof. Rolfs: Where does the saving come? That is 10x24 feet—240 square feet of lumber. More than would ordinarily be needed to cover a tree.

Mr. Harrington: Something on the same principle has been talked of in my section. Only, instead of using wood, we have contemplated using straw-board, which has been used in Ohio. It is manufactured in any thickness required, and in width it is about 102 inches, and no lumber required. It is a kind of paper treated with some substance and in such a manner that it will stand storms, rain and sun for two or three months in the winter. A manufacturer stopping with me last winter says it sells at $20 a ton in car lots. That ought to bring it to Florida at $30 a ton.

This matter of protecting orange trees is a matter that I came up here in hopes of getting information on. One gentleman suggests using a stovepipe. I have not grown my trees that way; I have not used any stovepipe. My trees grow very near

the ground. Last year I picked nearly one box off on my knees. I don't think there was one of those fruits that was three feet from the grounds. These would not be easily protected with a stovepipe. I never have protected a tree in any manner, but I shall have to do it. The question of protecting trees is one thing that I have thought a great deal about. Some say if you bank your trees wood lice will eat them up. Another says that is the case if you bank with earth, and still another says that if you protect with straw the rats will eat them up. So it seems to me that good common sand would prove beneficial, and it does not seem to me that the woodlice will hurt the trees, because I have trees budded below the ground which have never been damaged by woodlice.

Prof. Stockbridge: I recently saw at Mt. Dora at the Chautauqua, a specimen of paper having a coating of paraffine. There were two thicknesses of paper with a corrugated layer between which gave the entire mass elasticity and strength.

## DISEASES AND INSECTS OF THE CITRUS.

Report of the Standing Committee by E. S. Hubbard.

[See minutes, pages 1 to 5; item 30.]

Mr. President, Ladies and Gentlemen—This committee in reporting on Diseases and Insects of the Citrus, has considered the subject from a practical standpoint. Its members are practical orange growers and as such do not have the time, apparatus and exact special knowledge to study biological and organic chemical aspects of diseases and the life histories of insects, their natural enemies, or the comparative effect of chemical exterminators.

We refer members of the Society who wish to study these subjects to the reports of specialists which have been presented at former meetings, or the bulletins of the U. S. Department of Agriculture and the Experiment Stations.

In fact, the present attitude of many orange growers is fitly described by Mr. Moremen, of the committee, who says: "There is only one disease that concerns me now, the occasional absence of caloric in the surrounding atmosphere." Mr. Beed of the committee describes some of the resulting conditions as follows:

"All the trees in this vicinity are budded on sour stock and are not troubled with foot rot. With us the trees kept dying back nearly all of the first summer after the freeze, but since then we have had no trouble except in cases of hard freezes when the bud or sprout would be killed below, while above all would remain green and grow for awhile. One party here had a strange experience with a good many of his buds, when they were one and two years old. Most of those affected were buds that had had melanose. When they were banked they were in some instances struck with a shovel and bruised, and the next

spring when they were unbanked, there would be quite a decayed place around the bruises.

"Well, during the summer they commenced to bleed and the bark would decay, and finally become entirely girdled.

"Some trees, however, would bleed and die that had not been bruised in any way, and in some instances would decay all around without bleeding or showing any sign of there being anything wrong. We laid it to their having had melanose, though I hardly think that could have been the entire cause.

"The only thing that bothers us here about banking trees is wood lice. While they don't girdle a tree entirely they eat a good many places in them, and that, seems to sicken them more or less. Last winter I tried lime and sulphur together, but neither one did any good. Another year I think I shall try sprinkling with Paris green and some other substance to make it stick to the tree. The only thing I see against that is it may kill the beneficial bugs and insects after unbanking again."

These conditions occur in the hammocks of the Halifax river and are found in greater or less degree on high as well as low lands all over the State. Sweet seedling stocks that were affected with foot rot have in many situations collapsed and trees that were not affected before the '95 freezes have also degenerated into very unsatisfactory conditions.

In my own experience the scald that followed banking buds on sour stocks in damp soils with the attendant ravages of wood lice that had been working in the decaying wood of the stumps has led me to bank as late as possible and uncover early in February so that a large portion of my groves were unprotected on February 13th of this year.

In fact with stumps over six inches in diameter still further stunted by this freeze, I shall go slow in spending much time and labor grafting or budding till the new sprouts give indications of sufficient stamina to warrant continued care and attention, as it will doubtless be more satisfactory to replace most of them with new trees budded on sour stocks.

In a general way these experiences with sweet versus sour stocks have been decided in Europe in favor of sour stocks, and although the latter do not make as large trees, yet thicker planting of early bearing varieties will produce a given amount of fruit bearing surface much sooner and the small trees will rally more quickly from the shock of freezing if we unfortunately experience late frosts again in the near future. The common scales, white flies, rust mites and red spiders that formerly had so much attention, for the present are largely back numbers, but the appearance of the cottony cushion scale at Clearwater Harbor, which is more deadly than all these other enemies combined, demands serious consideration.

Pruning and destruction of trees, sprays and fumigation were powerless in California to control or hinder its spread, and the forlorn hope of sending Koebele to Australia to discover natural enemies, the introduction of Vedalia, the almost total destruction in a short time of the scale so that the Vedalia also for want of food became almost extinct, forms one of the brightest chapters in American entomology. In fact the natural enemies, whether insect, fungoid or bacterial, are the only safe and economical means of fighting the insect pests of fruit trees. It is true that before the natural ene-

mies have bred in sufficient numbers to control the pests the distracted horticulturists will use any spraying compound that promises relief, but I am satisfied the more active compounds are equally destructive to the natural enemies of the insects, while some of them have a stunting or burning effect on the trees that may prove as damaging as the pest itself.

I am convinced that not enough attention is given to the chemical action of sprays and fertilizers on the physiological processes of citrus trees and fruits.

The chemical composition of the starches, gums, sugars and cellular tissue is identical, there being but an addition of a molecule or two of water, or a molecular re-arrangement to convert the sugar of the sap into starch, gum and cellular tissue.

Saccharose or sugar is, carbon 12, hydrogen 22, and oxygen 11; the glucose, carbon 6, hydrogen 12, and oxygen 6, while starch, gum and cellular tissue are, carbon, 6, hydrogen 10, and oxygen 5. Nitric and sulphuric acid are used commercially to change starch into glucose or grape sugar and the effects of bi-sulphate and caustic soda sprays in sweetening or rendering insipid the juice of oranges are well known to many members of this Society, while fertilizers containing a high percentage of sulphate of ammonia have a marked influence in hastening the maturity and increasing the sweetness of oranges, though I am convinced all these effects are produced at the expense of the vitality of the tree.

The tree roots seem to have but a limited power of selection of food elements when presented in excessive quantities and the putrefactive products of organic nitrogen fertilizers not only produce coarse, poor flavored fruit, but derange the sap functions and produce disease. If there is a low percentage of potash and the soil is low and liable to saturation with bog ore solutions the conditions are still further aggravated and in a few years dieback, foot rot or limb blight are almost sure results.

An ample supply of phosphoric acid in the sap is necessary to enable plants to convert the sugars into fluid gums, and the gums into cellular tissues. The iron solutions may revert the phosphoric acid in both soil and sap, or the putrefactive ptomaines partially paralyze the protoplasmic sap functions so that the tree is hindered from converting the transitional gums into cellular tissue and they accumulate in such quantities as to rupture, or sour and destroy the bark.

An overfed tree is also more liable to the ravages of insects.

In conclusion we would recommend conservative methods of cultivation and fertilizing as the best preventives of insects and diseases.

With bearing orange trees a properly proportioned chemical sulphate fertilizer with cessation of cultivation and shading of the soil with grass or other green growth during the rainy season, has proved the safest general method of maintaining healthy trees and producing high grade fruit.

# CITRUS HYBRIDS.

**Possible Future of a Union Between the Common Orange and the Trifoliate—Earlier Hibernation, Later Blooming.**

Prof. H. J. Webber, U. S. Department of Agriculture,

[See minutes, pages 1 to 5; item 35.]

Professor Webber's address was delivered entirely without notes, but was illustrated by about fifty photographs showing the different shades of amalgamation between the evergreen orange and the deciduous trifoliate. The union of these two is what scientists term a violent cross, because, though both belonging to the citrus family, they are much unlike, representing two extremes of character. The first is evergreen and the fruit sweet, the second is deciduous and the fruit inedible. But the most marked difference is in the time of becoming dormant in the fall and of blooming in the spring; and it is to this difference that scientists and growers are looking with the greatest expectations of benefit.

The hybridization is accomplished by taking the pollen from the stamens of one variety and impregnating with it the pistils of the other. The pollen of the orange is conveyed to the trifoliate or conversely. The fruits produced by these hybridized blossoms are preserved, and the seeds from them are planted. When the trees springing from them arrive at a bearing age it is hoped that they may bear fruit having some of the characteristics of the orange and some of the trifoliate. Among the latter the desideratum of paramount importance will be the habit of later blooming.

Owing to the violence of the cross, it was stated by Prof. Webber, only about one blossom thus artificially fecundated, out of a hundred, bears fruit, and of the seeds thus obtained only about one in ten will germinate. When we consider, in addition to this, the length of time which must elapse before a sufficient number of fruits can be produced to enable any satisfactory test to be made, it will be seen what a herculean undertaking it is. Prof. Webber stated that it would be, at the lowest calculation, ten years before any substantial results could be expected, and it might be two or three times that period.

He exhibited about fifty photographs showing the potted plants resulting from these crosses. To the practical grower, not less than to the scientist, they were intensely interesting. The transition from a deciduous habit to an evergreen habit, or conversely, is a tremendous change in the constitution of a plant. Some of these little

trees seem to be puzzled, not knowing what to do with their leaves in the fall. Some dropped all of them; some retained all; some shed a part and retained a part. The blending of characteristics in respect to foliage, bark, thorns, habit of growth, etc., was equally curious.

Now if, some time in the future, even if it should require a generation to accomplish it, the government experimenters can develop for us an orange which will bloom a little later (we do not want one that will be deciduous, for that would destroy its charm for the tourists), we may reasonably hope for a considerable accession of hardiness, together with this deliberate habit. The execrable fruit of the trifoliate parent may give a tolerably bad dash to the juice of the cross-bred orange. But our Florida horticulturists may safely be trusted to take care of that feature of the situation. If they can only have provided for them a tree which will have the discretion to keep quiet and lie low until that Eolian cave up in Manitoba shall have been closed for the season, they will manage the rest. With that wonderful chemistry of fertilization, culture and budding already developed by them, they will create a good orange out of an indifferent one.

It should be said here, that Prof. Webber has no thought of developing an orange which can be grown as far north as Washington, as has been stated. He will be content if he can originate one that will be hardy enough to escape the northers and flourish in Florida.

It may be ten years, it may be twenty years, before this result can be accomplished and an orange developed from these hybrids which will meet the situation in Florida.

## DISCUSSION.

[See minutes, pages 1 to 5; item 36.]

Mr. Phelps: To my mind that is the most interesting and practical subject that has come before the Society this session. I have today, perhaps, thirty or forty varieties—I thought a month ago I had a hundred. I fully coincide in what Prof. Webber says. I have never found an instance where the stamina of trees was not doubled by crossing. Invariably I have found an increasing flavor in crosses. I have never understood why people should not grow crosses. My friend, Mr. Meade, who never goes further away from home than the Hotel Placide, is very successful in crossing orchids. Therefore I say that I don't think we have more than begun in the development of citrus growths, and I am more pleased with that paper than any I have heard in a long time.

Mr. Bacon: We all know that in different localities where orange trees are grown, in some they mature earlier and in less time than in other localities. On the East Coast our orange trees in ordinary seasons bloom in January and February, and we don't consider these oranges are in the best condition or in their prime until twelve months from that time; whereas in the interior of Florida I understand, they bloom about the same time and possibly a little earlier, and mature

their fruit in December, about two months earlier. Now, if you take these oranges in our locality, and let them have no bloom until March, and then mature their fruit in December—that is, perhaps, three months' shorter growth—will not that have a tendency to deteriorate the quality of the fruit?

Prof. Webber: Probably the fruit would be deteriorated to some extent, but by process of breeding we could change the character. Oranges bloom in the Bahamas in the latter part of February and ripen in September and October. If one orange can do that, another can. The trifoliata requires a shorter time to ripen than the common orange. We have developed variety after variety in Florida.

Mr. Hart: As bearing on Mr. Bacon's question, I would say that June bloom oranges very seldom amount to anything much, and they are a very small feature in the market. We should not expect a heavy crop from June bloom. Where the trees have a June bloom and a late crop, the oranges seldom mature in good shape, or are of any value. They are coarse, immature and in fact never do ripen well. If there is no early bloom at all and a good heavy June bloom, and the tree sets a heavy crop, the fruit will become marketable and perhaps be very good fruit.

Mr. Phelps: What Mr. Hart says about June bloom is true; it is always a misfortune to have a June bloom. I remember one instance about eight or nine years ago when we had a spring drouth and our trees did not start in the spring. I did not touch the ground but let it lie dormant and let the weeds grow. In May I thoroughly irrigated and fertilized it, and there came an enormous bloom. Once in thirty days I put three barrels of water to each tree, and fertilized, and in August I shipped the largest crop I ever had. I have often thought if I could keep a tree dormant until later in the spring it would be better and would produce better and smoother fruit. Ship it in May, and keep the trees constantly going.

Prof. Webber: One other matter; simply a word in regard to the germination of the seeds of the second generation. It is a matter of fact that other hybrids are often sterile.

I possibly ought to emphasize the length of time it will take to secure anything of value in this connection. I suppose many a man in the audience will lose faith. I trust that the members of this Society realize that time is necessary. It may take ten, it may take twenty years to secure satisfactory results from true hybrids.

Mr. Phelps: I would say on that same point, that there is one hybrid in which I am very much interested, and that is one between the tangerine and the grape fruit. I have been experimenting with them for ten years. I have never seen more than two seeds in the hybrid. I have never seen more than a hundred seeds germinate. But it has the most perfect fruit, in looks, feeling and appearance, that I have. I have sold them for $12.50. Yet it is too small now to pay—300 in a box. The skin is no thicker than brown paper.

Mr. Putney: In answer to Mr. Bacon. I wish to state that after thirty years' experience in New York, New Jersey and Florida, the invariable rule is with strawberries, raspberries, oranges and pineapples, and all the rest, that fruits which have the shortest period of ripening are of the poorest quality.

Mr. Hubbard: There is one point in the making of these hybrids, that is the length of the ripening season of the fruit. The tendency will have to be toward the early ripening of the varieties. With the orange

which ripens fruit during the winter, if you keep the fruit on, there is a large flow of sap necessary to keep up the life of the fruit. The tree not loaded with fruit will not need so much sap as a tree which is full of fruit.

Mr. Phelps: In all trees which have fruit on, there is a regular flow of sap once a month. That fact was told me when I was a boy and lived in a lumber country. In the full of the moon bark peelers peeled the bark. I think there was no other time. Old milling men know this.

## SOME FLORIDA INSECTS.

**Notes on the San Jose Scale, the Cottony Cushion Scale, and the Garden Flea Hopper**

Professor H. A. Gossard, of the State Experiment Station, Lake City, Fla.

[See minutes, pages 1 to 5, item 38.]

Mr. President and Members of the State Horticultural Society—A number of insects of more or less serious nature have come under my observation in the short time that I have been in the State, but I shall confine myself to a discussion of some three or four that seem to me to be of particular interest.

### SAN JOSE SCALE.

In my judgment, perhaps the most serious insect pest in the State, because the most difficult to control, is the San Jose scale. I do not deem it necessary to enter into the details of its life history at this time, but take occasion to observe that it is known to occur in a dozen widely separated localities in Florida, and I have positive reasons for suspecting that it occurs in a great many more places than it is now known to infest. The entire southern part of Georgia is said to be pretty thoroughly infested with it, Alabama is sprinkled with it, and we must, therefore, conclude that it has probably stepped across the line in a good many places. It would seem that it is hardly a question of time any longer, but is probably a question of fact already that this insect is to be found in some of the Florida nurseries, and is getting a wide distribution in the State.

I wish to inquire what has been the experience, if any, of the fruit growers of Florida in the use of either pure kerosene or mechanical kerosene mixture against San Jose scale. The contradictory results obtained by different entomologists in other sections of the country, and the absence of any opportunity to conduct experiments of this kind under the auspices of the Florida Experiment Station, open up an interesting topic for discussion. In response to inquiries that I have received in regard to the treatment I have been obliged to say that these remedies are as yet untested by the Experiment Station, and that we can only recommend their use with the greatest caution. We have generally advised that a very dilute application be applied to a few trees at first, and if the results proved satisfactory, to then use it upon a larger scale,

and of greater strength, if necessary. I have conversed with but few practical fruit growers in Florida who have made use of this remedy, and am, therefore, very desirous that we have an experience meeting with reference to it. One of the Northern stations, namely Maryland, has taken strong grounds against the use of pure kerosene, while perhaps the majority of them are not inclined to condemn its application. Since it seems to be a matter of common observation that the Florida fruits have much greater resisting powers than their northern congeners, it would seem that strong kerosene applications would be good in Florida if they are good anywhere. It may be of interest to observe that Dr. J. B. Smith, of the New Jersey Experiment Station, has made some experiments with crude petroleum, and while not expressing himself as having reached any positive conclusion, his present inference seems to be that the crude petroleum is probably much more desirable than the refined kerosene for either pure or dilute applications.

With the present status of the San Jose scale, white fly, and a few other pernicious insects it would seem to me that a thorough fumigation of all nursery stock and buds is a desirable matter. From some of the correspondence that has come into my hands, I myself would be unwilling to plant nursery stock received from some of our Florida nurseries, possessing certificates of inspection, without first giving their stock a thorough treatment of hydrocyanic acid gas. For the benefit of parties who do not have at hand the formula for this work, I submit the following directions: The small nurserymen will probably find it convenient to construct a box six feet long, three feet wide, and two and a half feet deep. Common flooring laid double will make a satisfactory enclosure. The inside layer of boards can be run at right angles to the outside layer, and thus both strength and durability will be secured. It should be left open on one side, and the plants should be laid upon the ground and the box turned over them. The following amounts of chemical materials will be required for every 100 cubic feet of space enclosed: 1 ounce potassium cyanide, 1 1-4 ounce sulphuric acid, 1 7-8 ounces water. The liquids should be placed in a glass container, such as a Mason's fruit jar, and when all arrangements are completed the box should be raised enough to allow the operator to drop the potassium cyanide into the glass jar. The box should then be lowered quickly and loose dirt shoveled about the bottom to render it air tight. The plants should be subjected to the fumigating process for from three-fourths of an hour to an hour and a half, and are not likely to be injured if left under cover for a greater length of time, especially during the shipping season when they are somewhat dormant. Buds, of course, will need to be removed a little sooner than trees. A large nurseryman may find it desirable to construct a regular fumigating house for the purpose of fumigating all stock sent out. I believe that nurserymen who will take the trouble to follow these suggestions will find a more ready sale for their stock than those who do not, and I most certainly recommend that it be followed upon the receipt of stock from any establishment not personally and recently known to the recipient.

It should be remembered that hydrocyanic acid gas is a most deadly poison, and that it should never be inhaled even in the smallest quantity. The operator should always approach the fumigating box from the windward side, and upon uncovering the stock

should retire immediately from the vicinity, going in the direction from which the wind comes. Some individuals with nervous peculiarities of heart action have been fatally affected by a single whiff of this gas, and while it is possible that the great majority of people will not be affected in precisely this manner, the greatest caution must be observed in handling it at all times.

### COTTONY CUSHION SCALE.

After San Jose scale one of the most menacing insects in Florida at present is the cottony cushion scale. No particular apprehension need be felt in regard to this insect provided it is properly looked after, and the State makes proper provision for the continued and regular keeping and dissemination of the Australian lady-bird. If such provision is not made, the cottony cushion scale will undoubtedly become by far the most serious insect pest that has ever secured a foothold in this State, unless the horticulturists themselves unite and provide by private subscription the means which the Legislature has failed to appropriate. I believe that I have delivered myself with too great plainness in regard to this matter to the horticulturists and to such members of the Legislature as I have been able to reach, for there to be any possibility of mistake in regard to my views on this subject, and believe that I have fulfilled all my responsibilities in reference to it. My presumption is that if the people of Florida want this insect controlled or if they want any sort of legislative action referring to insect pests that their wishes will be enacted into law. Our conditions I have endeavored to make plain. If the judgment of the people interested decides that the conditions as I have stated them and with which many of you are perhaps even better acquainted than I, requires attention it remains for you and for every man in Florida with interests at hazard to demand that his representatives in the legislative chambers shall provide for our emergencies.

The cottony cushion scale is an Australian insect, having been imported into California as early as 1868, and it has also caused great and widespread destruction at various times in New Zealand, South Africa, Portugal and elsewhere. In no country has it ever been controlled except by means of the lady-bird, though I am not prepared to say that the persistent and intelligent use of such insecticides as hydrocyanic acid gas and some of the resin washes might not be sufficient to keep it in check, but it certainly is not worth while to endeavor to manage it by such means. In no case has it ever secured a foothold as it now has in Florida with the accompanying climatic condition without eventually spreading destruction far and wide unless the lady-bird quickly appeared on the scene. It has always disappeared before this predaceous insect like snow before the summer's sun, but one point of difficulty arises from the fact that the lady-bird often does its work so well that it completely starves to death for want of scales to feed upon, and yet a scale may be left here and there to restock the districts from which it has been cleared. This has been the general experience of every community that has failed to provide for the artificial propagation and retention of the lady-bird so far as my knowledge extends. From the fact that we have not been able in four months to secure a living colony from the California Board of Horticulture, the necessity for having a propagating plant of our own is obvious.

The principal points in the economy of

the insect which render it such an uncontrollable pest are as follows: The female insect is the mother of from two hundred to more than a thousand young, and the larvae are able to do without any food at all for weeks at a time and are also able to live upon almost anything in the shape of plant, tree or shrub. There are two or three broods in a season, and in such climates as are found in South Florida and California, it goes on breeding, though slowly, even during the winter season. The insect is motile in all stages of its existence except in the egg stage, and when the female is developing the egg mass. The newly hatched larvae collect upon the leaves and tender twigs and have the habit of dropping from them, and committing themselves to the wind, by which means they are quickly transported to distant areas. They may be further transported by birds, by flowing water, by other insects, by nursery shipments, upon the clothes of men, and in the hair of animals. The efficacy of the lady-bird depends largely upon these factors: Each female produces from one hundred and fifty to two hundred eggs which are deposited beneath or near the ovi-sack of the cottony cushion scale so that the young lady-birds upon hatching bore at once among the eggs of the scale and devour them en masse. They also attack the scales themselves in all stages so it is readily seen why it is that these little bug hunters can more effectually clear out the scale than any other agency. So far as is known these lady-birds will feed upon no other food in this country than the iceryas. Permanent colonies of the lady-birds have been maintained at intervals by the California Board of Horticulture, by Cape Colony in South Africa, and by the Portuguese government.

THE GARDEN FLEA HOPPER (*Halticus uhleri*).

During the spring some insects of the family capsidae were sent to me with the complaint that they were destroying a crop of celery at Lakeland. I was unable to determine the insect at that time, but have since recognized it as the garden flea hopper (*Halticus uhleri*), known to feed upon potatoes, wild horse nettle, morning glory, clover, pumpkins, ground cherry, beans, peas, cow peas, prickly lettuce, rag-weed, mallow, plantain, oxalis, crab grass, cabbages, burdock, and other plants. It is apparently distributed throughout the United States and Canada. The insect is a small, shining, black plant bug with portions of the antennae and legs light yellow; tufts of yellow hair are also found upon the wing covers. There is both a long winged and a short winged form of the female. The life history of the insect is not very well known, but it is certain that its numbers fluctuate in different seasons. It is not known whether the insect hibernates during the winter in cold districts or passes the winter months in the egg stage. It is one of the sucking insects and has the habit of jumping or hopping like the flea beetle, from whence it has received its name, the garden flea hopper. The adult insects were received in January from which we infer that it passes the winter in the adult stage in Florida and it is evidently capable of inflicting a great amount of damage at that season. It would seem that a spray of kerosene emulsion or of kerosene mixture as strong as the plants will take without injury would be the most efficient remedy though hardly applicable to celery on account of the flavor that kerosene is apt to impart. They may possibly be jarred into

sheets saturated with kerosene, or into pans of water upon which kerosene is floating. The jarring process must be performed in the early morning, then the insects are stupid, and not so quick to take to flight as in mid day. From the good results that have been reached with "rose leaf insecticide" against similar insects it would be interesting to try its effect upon this species.

## DISCUSSION.

[See minutes, pages 1 to 5, item 39.]

Prof. Gossard: I will say that I was informed before coming to Florida that the scale was here, and even before coming I had addressed Dr. Howard, who gave me the needed name. We requested a consignment of ladybirds, and turned them loose in Clearwater Harbor. The one colony they transmitted started a few days before the freeze, and it was about nine days after the time they were shipped to me that they reached Florida. They had come through all the cold in the North, and had been delayed by snowbound cars, and they were all dead before they got here. I told them, and they said they would send another colony as soon as they could—in about a month. About six weeks ago we made arrangements to introduce ladybirds at Clearwater Harbor, so that I have no doubt that the initial steps have already been taken. We also keep a permanent colony there until we find it is no longer necessary. After they have started and before any more scales reappear, we will have something to take care of them. It will be about two months before there will be a sufficient number to turn loose, so that we would be very unwise to depend upon Col. B—— for our stock. It may be necessary for the horticulturists to appoint a committee to advise with the Legislature providing for a general bill for the protection and dissemination of ladybirds. If the Legislature does this we are all right.

Mrs. McCarty: I would like to ask if any member of this Society knows what the San Jose scale is. I have read about it in the papers. But for the other scale, I can give a formula for preparing an emulsion of kerosene which will drive all the good bugs away, whereas the vile bugs will be killed. I don't approve of the use of those acids. The kerosene emulsion will kill the bugs and spare the people.

Mr. Bacon: How low a temperature does it take to kill the ladybird?

Mr. Gossard: That depends if they are protected or not. I don't think 32 degrees would kill them all out. I think some of them would come through even at as low a temperature as 20 degrees—but I don't know.

F. D. Waite: Do I understand that they have the cottony cushion scale at Clearwater Harbor?

Mr. Gossard: Yes, about twenty acres. I was down there some weeks ago, and I am informed that there are some Clearwater Harbor people here who could give us some idea of its spead.

Mr. Thompson: It spread out about five miles.

Dr. Von Herff, of New York: What is the food of the ladybird?

Prof. Gossard: It is necessary to keep a thriving colony of cottony cushion scales for the ladybirds to feed upon.

J. P. Mace: I have had a little experience with San Jose scale. I think it was about two years ago that I found five or six affected trees in an orchard of about 400 trees, and of course I did not know what it was, and I sent a sample to Prof. Rolfs. He pronounced it the San Jose scale. I found it scattered through the grove, fifty or seventy-five trees, more of less, being affected. I applied pure kerosene with a brush. That seemed to clear the trees, because they put out and made fine tops, as well as some peaches. I made arrangements for a pump gotten out by the Deming Company, and was going to use water and kerosene. I placed my order in October, expecting to spray my orchard early in the season. The order was not filled, as they did not have them in stock. The matter was delayed, and I did not get the pump until about the 10th of June. By that time I had everything in shape, and the trees were in full bloom and apparently all right. I started with the intention of giving them an emulsion. It looks like milk. I gave them 25 or 30 per cent. of kerosene. The freeze coming soon after, I am not able to give the results. So far as I could see up to the freeze, they were not hurt in the least. They were in bloom. Not over 10 per cent. at the outside, of the bloom was blasted. There was some early fruit which was not hurt. They were vigorous up to the time of the freeze. My location is Lake Helen, Volusia county.

Prof. Rolfs: So far I have not found any very large scale since the freeze.

Dr. Von Herff: I have had some experience. I have tried to treat the scale for some years. I would advise no one to use kerosene, unless with the greatest care. I used some in solution a few weeks ago, but the trees now show signs of decay and are more unhealthy. The effects of kerosene, undiluted, are bad. If it does not kill the trees, their constitution is weakened. I advocate the gas treatment. The gas treatment is not dangerous unless it is inhaled. Use ordinary precautions. It is quite simple, and there is no danger whatever if proper precautions are taken.

Mr. Hart: As in all our sessions, a great deal is said about spraying to rid our orange trees of injurious insects. For a great many years I have not sprayed at all. I concluded not to spray but to encourage the insects as far as possible, and it has been entirely satisfactory, not only to me but to others who have done the same thing. There will be times when the scale and other insects will be very bad, but on the few individual trees which have become nurseries for the enemies of these insects they will increase and overcome the scale on the trees and spread and clean up the grove. Great stress is laid on the work of the ladybird. They are good as far as they go, but their work is limited. They are of good size and although they may appear to be present in large numbers, yet they are comparatively few.

# PEACHES AND PLUMS.

**Protection Against Cold by Banking, by Open Fires and by Shedding.**

Report of the Standing Committee, by C. C. Shooter, Waldo.

[See minutes, pages 1 to 5, item 42.]

As the result of last winter's blizzard the problem of how to protect our peach trees and the fruit and bloom from cold, is now a matter of the utmost interest and importance to the peach growers of the northern and middle sections of this State.

This is not by any means a new problem; it has always been with us more or less. The early peach crop has frequently been injured and sometimes entirely destroyed by late frosts. The early varieties of peach trees have also been killed to the ground twice within a very short period. In 1895 I had a fine orchard of Peentos entirely destroyed by cold and this year my unprotected trees of the Waldo, Jewel and Angel varieties were also killed to the ground.

The growing of early peaches for the Northern markets is now a well established industry, yearly growing in importance. As the crop increases so also does the necessity of investigating and finding some means whereby the great losses frequently entailed by late frosts and blizzards can be mitigated or prevented.

As a primary precaution, I strongly recommend that all peach trees of the early varieties should be budded much lower than is usually done, especially where such trees are to be planted in localities subject to severe cold; and further that after the trees have been thoroughly examined and the borers removed they should be banked at least twelve inches above the bud before the 25th of December every year. In this way the buds will be safe, and if the top should be destroyed the trees will soon make it up and be in bearing again the following year. I have thoroughly tested two other methods this winter, one of which saved the fruit crop when the mercury stood all night at 22 degrees. The other saved the trees and a crop of Waldo peaches with the mercury at 6 degrees. On the night of February 8th the mercury stood all night at 22 degrees. The peach trees were in full bloom with young peaches just forming. I lighted fires in the orchard, one between every four trees and kept them burning all night. This raised the temperature sufficiently to save the bloom and young peaches, while those outside the line of fires were killed. This plan was perfectly successful with the thermometer at 22 degrees, and while it entails

considerable labor and expense, it is a precaution that the peach growers, with a valuable crop at stake, cannot afford to neglect. To protect the trees against greater cold, the peach grower can only fall back on his banks or build a shed over his trees and light good fires inside it. This latter plan I have also tried on 300 peach trees planted between orange trees under shed. Fires were kept burning during the whole time of the freeze. The first night the mercury outside was 6 degrees, the second 10 degrees and the third 24 degrees. The peach, orange, and even banana passed through the freeze without serious injury. There were three varieties of peach trees. The Waldo, Jewell and Kite all in bloom, with young peaches on; most of these fell off, they probably got chilled before we were able to get up sufficient heat with the fires, but they still had on sufficient bloom unopened to set a full crop. The Waldos have a fair crop on now. The Jewells being only one year old were too young to bear, but set a few scattering peaches. The Kites have dropped most of their fruit. This being my first year's experience with shedding, it is too early to determine its ultimate bearings. But so far there is every reason to be satisfied. It saved 300 trees which would have taken three to four years to replace; also the fruit crop of the Waldo peaches. The half shade so far seems to suit the trees admirably. They present a healthy, vigorous, luxuriant appearance, and have foliage at least one-third larger than trees in the open. Also up to the present time I have noticed that the fruit has not been attacked seriously by the curculio. Last year the same trees were badly infested, and this year nearly all the fruit on the late peaches outside is already stung. It may be that the high walls and cover will keep the beetles out.

## IRRIGATION FOR PEACHES.

Observations on General Culture by B. M. Hampton, Lakemont, Polk County, Fla.

[See minutes, pages 1 to 5, item 42.]

The past season I used water freely from time of blooming till the fruit was ripe. I never saw any peaches so fine of their kind or so free from all bitterness, though they did not at any time have rain enough to wet their roots. I sent last year two peaches to the Horticultural Society meeting that I pulled the first day of May. They were the Jewell peach. Before the rains set in I quit watering two trees that I have been getting fine fruit from, just to see what effect it would have on fruit still on the trees, with the result that the remaining fruit on these two trees grew little larger than when I quit watering them, failed to color up like the rest, and had plenty of bitterness. While at the same time all my other peaches of the same kind colored up most beautifully, were large, luscious and entirely free from bitterness. I must say it was the finest fruit of its kind that I have ever seen in Florida, and everyone said the same that saw them.

Hence I urge irrigation in all dry seasons and cannot too strongly impress upon the grower that irrigation is the key to success with fine early peaches in South Florida. I have never been bothered with the curculio or peach borer, but I find the root knot troublesome if the trees are not kept well cultivated.

I keep my trees under clean culture from February 1st to the middle of November and then let them rest. By this plan the bloom is retarded till the spring when danger from cold is over.

My trees are not quite so full as last spring but are full enough and some I shall have to thin out.

As to plums, I had as many as 100 of the Kelsey and Botan growing at one time. I have discarded them as not adapted to this section. The fruit is fine but does not bear sufficiently to be profitable. In some parts of Polk County these plums succeed well enough to be worth planting for one's own use at least.

## DISCUSSION.

Mr. Putney: I would like to ask Mr. Mace as to the cause of his trees blooming so early and getting killed. Was it ceasing cultivation too early?

Mr. Mace: My peach trees acted rather wildly all last season. I can't account for it, except it was the drouth. They dropped their leaves in October, then they put out and began blooming in November. Kept them cultivated as long as July. My peach trees are situated in the center of the squares of the orange trees, and are kept fertilized.

I will say a word more about spraying with kerosene. I had a few trees of late varieties—probably about seventy-five trees—and as far as I can see they are not hurt in the least by spraying, either the foliage or the fruit.

Mr. Putney: I wish to say that last summer I spent the whole summer and part of the fall in New York City, and as I was intending to plant peaches and was interested in fruit, I made notes of the conditions at that end of the line, on the wharves where the fruit was sold and with the dealers. I found that when peaches were in market in New York City every other fruit took a back seat. Several commission men in New York City told me that if I could, in May and June, before the Elbertas came in from Georgia, place from five to ten carloads of fancy peaches, they would bring remunerative prices. They never realized less than $2.50 up to $7.50. I don't think we can do better, particularly in the lower counties, than to make a trial trip of peaches. I would say that I mean that number of carloads of peaches daily. I got my pointers from two prominent commission houses.

Mr. Mace: I made a mistake in putting peach trees in my orange grove. Because I find that what may be good for one species of tree is bad for the other.

# VEGETABLES.

**Observations During the Past Winter in Manatee County.**

J. B. King, of Braidentown, of the Standing Committee.

[See minutes, pages 1 to 5, item 44.]

The season of 1898-99 has in many respects been a most peculiar one. During a residence of eighteen years in the State, engaged in horticulture and vegetable growing, noting closely weather conditions and changes, I can recall no season like it. We have had seasons as cold, but they have been dry, and the soil would soon warm up after a cold wave had passed over us, and vegetables that had been protected would soon grow off under the warmth of our genial sunshine. We have had seasons as wet, with clouded skies, but they have not been accompanied by such very low temperatures; and, perhaps it has been well for us that we should have had so much rain, as otherwise the very severe blizzard of February 12th and 14th, sweeping the continent from ocean to ocean might have sent the mercury much lower, completely paralyzing our already crippled industries.

Who of us can recall the conditions of a freezing temperature following within six hours of rainfall? And yet these were the conditions that confronted us on the morning of February 13th as far south as the Manatee river section, accompanied by light falls of sleet and snow during the greater portion of the day.

Coming upon us so suddenly, plants both in field and seed beds were thoroughly chilled before they could be protected, and heavy beating rains following within a few days added largely to the damage already done; consequently seeds planted after the cold and rain bid fair to do better than these injured plants, and will come into bearing almost as early.

To realize that the season of 1898-99 is a season to itself, we need but to look at the market reports; north, south, east and west. Who of us can recall a time, except when the vegetable industry was in its infancy, that Florida cabbage has been eagerly taken at 4 to 6 cents per pound, and everything else in proportion?

Now for the lessons of the year. What we learn by experience is not soon forgotten, and would the beginner but take heed to the advice of the experienced it would be well; but human nature like, we are never satisfied until we too meet and form the acquaintance of Mr. Experience. The past is said to be the criterion of the future, but

this will not hold good when applied to the seasons, except in a general way, for we know not at seed time what conditions may confront us before the harvest; consequently we must as far as possible be prepared for extremes of all kinds hoping and trusting for the best.

To insure any hopes of success, there are certain things to be observed: 1. Select a fertile soil, not too high and dry, but with ample fall to admit of good drainage. No matter how dry the fall and winter may be, ditch deeply and thoroughly that all surface water in case of heavy rains may pass off quickly. Better have the ditches and not need them, than to need them and not have them, and you will be sure to need them sooner or later.

Prepare the soil thoroughly as far in advance of planting time as circumstances will permit. Fertilize judiciously, using all you think you ought to, and then put in half as much more.

Have ample seed beds, twice as large as you think you will need, keep them full of large stocky plants, and if you finally throw most of the plants away so much the better, for in this case you will have had a favorable season. The seed bed is a safeguard against adverse seasons.

Plant neither too high nor too low. If the season is wet stir the soil moderately deep as soon after rains as the ground becomes dry enough. If the season is dry keep the cultivator or harrow going at short intervals as light as possible.

## CASSAVA CULTURE.

### A Discussion.

[See minutes, pages 1 to 5, item 46.]

Mr. Stevens: I have been requested to ask if any member of the Society is raising cassava.

Mr. Moremen: I have been growing cassava for the past twenty years as feed for domestic animals. As a stock feed I class it equal with anything that can be grown in Florida for that purpose. Using it for cows, it produces a larger flow of milk. Also horses and pigs thrive on it. I find that it is a very exhausting crop on the land. It is a crop very easily grown and easily cultivated. It is easy to harvest; you simply cut off the tops and pull up the roots. In loose soil they are easily pulled up. It costs about as much to grow as corn. In my section it requires no fertilizer at all; on light pine it is the better for a small application. Nineteen pounds of roots is the highest amount I ever took from one hill. Dig it as you require it and it will keep until you want to use it. Ordinarily it will ferment in about a week. The seed is the cane; it is kept in a bank through the winter; the bank must be kept free from standing water. Ordinarily it is planted four or five feet apart.

Mr. Amsden: I have had difficulty about getting it to grow. I lost about fifty per cent. of my seed canes and somebody sug-

gested that we sprout them the same as potatoes.

Mr. Moremen: I have had no difficulty. I usually turn my cattle into the cassava; they eat the small leaves and leave the stalks. The sun thus ripens and hardens the stalks and they keep bettter through the winter. I cut them down after this and cover them with sand. I plant them in February. Cut them into pieces containing several eyes. In cutting them, if they are split they will dry out. It is best to saw them. Plant about four or six inches deep. Better plant six inches than two inches, if the soil is not moist. It is good for all stock; it should be washed first. Most animals have to be trained to eat it.

Mr. Harrington: I have been raising it for nine years. My method is a little different. Last year, on the 20th of December, I cut my cassava. All my rows were five feet apart, and four in the row. This is in central Polk county. The land in which I plant it I usually plant in velvet beans the year before, and turn under in the fall, and plant the land in cassava before there is any danger of frost killing the cassava.

Question: Does the frost kill down the cassava?

Mr. Harrington: It was killed off in some places, but has come up again. Frost doesn't generally damage it very much.

It is well to apply nitrate of soda in the beginning of the ripening season, twenty-five pounds to the acre once or twice during the ripening season. Our stock eat it readily. My mules will leave the corn for the cassava. It saves one-half of my grain bill, and I think I can make it save me three-fourths or even seven-eighths.

A member: I have had a little experience with cassava, and I think the success or failure of cassava depends largely upon the quality of the seed planted. The larger the cane, the better the quality of the plant. It is not advisable to plant the small canes, as they will not make a strong plant.

Mr. Harrington: Some gentleman suggests working it two or three times, but I cultivate it all the year.

LATER DISCUSSION,

[Placed here for convenience.]

Mr. Mann: In refernec to the remarks by Prof. Stockbridge on cassava, and keeping it for weeks; I can't do that, and I would like to understand how it is done. I have to dig it fresh every few days.

Prof. Stockbridge: In reply to the query, I will say that so far as my personal experience has gone, I have had no difficulty whatever in keeping this crop. I kept cassava last year in a perfect condition from February to July, and at that time it was pronounced by glucose manufacturers to be in perfect condition for starch making. Some gathered in January is in perfect condition now. So far as I am able to give the essential precautions to be taken, I would say, be sure the root is dry, and keep it under cover. Go into the field and dig the cassava, allow it to stand until it is dry, throw it on the barn floor, and it will keep a long time. That is my experience. I don't know why some of you have not been so fortunate, even if the roots are broken. I don't think there is anything in the variety. We have only one or two varieties in the State, at most, three. We had two, and I don't see that there was any difference.

Mr. Neeld: There may be something the matter with the soil, in keeping qualities of cassava and other things. I can't understand what Mr. Mr. Mann means by having

to dig every few days. The roots are just like sweet potatoes.

Mr. Mann: I have been raising it for nine years, and if dug, it always gets blue after a few days.

Mr. Crane: In the West Indies, cassava and yams are kept by rubbing them with lime.

Mr. Schmelz: One of my neighbors keeps it year after year, from one season to another, by grating and drying it.

Mr. Cameron: There is a large dairy in the suburbs of Jacksonville that keeps it by digging it up and covering it like potatoes.

Mr. Anderson: I have had considerable experience with cassava. Where I have a great deal of room and don't find it necessary to dig it up, I leave it in the ground, and it is never known to rot. There are many who say that the great trouble in raising cassava is the digging of it. I simply take a little hold and pull it up. Have raised it six or seven feet high; not the yellow variety. I keep it pretty well fertilized.

I have always been in favor of raising cassava in Florida, and as master of a vessel for twenty-seven years, and going through the West Indies, I found that the people there use cassava instead of bread. Cubans tell me that two-thirds of them use no other bread than that made from cassava. I have eaten it myself. I like it in the way of pancakes. I don't know whether you gentlemen are aware of it or not, but cassava flour is a very old article. It was eaten by Europeans in the sixth century. Columbus, when he landed in 1492 caused the Indians to be so frightened that they ran away, and hid in the woods, but they came back and felt Columbus and pulled his nose, and finally he gave them some beads, etc., and the Indians went off and when they came back they brought him bread made from the cassava.

But I do know that not only is cassava good for bread and starch but I can tell you gentlemen that when you put on a pair of rubber boots or a celluloid collar, you don't know whether you are wearing rubber or cassava. S. J. Hobson, of New Haven, manufactures cassava into substitutes for celluloid, rubber, whalebone and malleable glass. I had some samples at the Sub-Tropical Exposition. I could have brought them with me this time. He came here to visit me two or three times while I was shipping to the companies. Came here and showed me how he wanted it. I cut it up into long strips and dried it, and packed it into orange boxes, and shipped him cassava at different times for the whole year, and then he wrote me that the freight was so high from Florida, that he could get it cheaper from the West Indies. If you can get half the price he paid me, there is nothing in this country that would pay so well to raise as cassava.

As far as beef or pork is concerned, there is no finer beef or pork than that raised from cassava. The best I ever saw raised in my life was from cassava.

Mr. Remmers: We have only two varieties, the white and the yellow. The white is rather the sweeter of the two. What we have now is of a poorer quality than we should have. It has been grown without trying to improve the quality. I believe that if more attention was paid to it, a few years would see a great improvement in the quality. As to what we can grow per acre, I can't say how that is.

Mr. Hampton: As there seems to be quite an interest in cassava, I will say that there has been a good deal of cassava

grown and used in place of wheat when wheat was high. We used some and made it into flour, half and half with wheat. We preferred it to wheat flour.

## HORTICULTURAL QUARANTINE.

Resolutions and Bill Presented by the Committee Appointed for that Purpose.

[See minutes, pages 1 to 5, item 47.]

Mr. President—Your Committee appointed to consider the question of the desirability of a law to control insect pests, etc., beg leave to hand you the following bill covering the question. We recommend that the Society send this bill to some member of the Legislature, said member to be designated by the Executive Committee, and urge its passage, as it affects vitally one of the greatest industries of our state. H. A. Gossard, E. L. Wartmann, M. S. Moremen, P. H. Rolfs, E. O. Painter, Committee.

As the bill is long the following syllabus is given, the bill itself being preserved in the archives of the Society.

SYLLABUS.

SECTION 1. Creates a State Board of Horticultural Inspection, consisting of five members, including the Professors of Botany and Entomology of the Experiment Station and three others, to be appointed by the Governor, who shall receive the recommendations of the State Horticultural Society.

SEC. 2. Oath of office.

SEC. 3. Shall meet annually, electing usual officers. Secretary may receive compensation to be fixed by the Board, not to exceed $250 a year.

SEC. 4. The Entomologist of the Experiment Station to be the Inspector of the Board, whose duty it shall be to collect and publish information and to inspect all infected premises or horticultural and apiarian stock and materials.

SEC. 5. The Inspector shall report all results of his inspection to the Secretary. He shall use his efforts especially to propagate the Australian lady-bird as against the spread of the cottony cushion scale.

SEC. 6. On discovery of any infectious disease or injurious pest he shall order the person on whose premises it is found to abate or remove it within five days, and meanwhile establish a quarantine against the premises.

SEC. 7. If the owner objects, the Inspector will notify him of his intention to arbitrate the matter.

SEC. 8. The owner shall appoint one member, the Inspector a second and these two a third, who shall constitute a board of arbitration.

SEC. 9. After ten days' notice this board shall try the case, with power to summon witnesses. If they decide in favor of the Inspector, the latter's order shall be carried out by the Sheriff, who shall collect the costs of the trial, including two dollars for each arbitrator, to be paid by the owner. If the decision is in favor of the owner, the

county shall pay all the costs, including the two dollars for each arbitrator.

SEC. 10. If the owner is absent or refuses to obey the order of the Inspector, the Sheriff shall enforce it. The costs shall be paid by the county, but this shall be reimbursed by a lien upon the property. An action to foreclose this lien shall be brought within 90 days. All costs shall be paid out of the proceeds of the sale and the balance, if any, turned over to the owner.

SEC. 11. Any person refusing to obey the order of the Inspector or the Sheriff, or hindering the execution of such an order, shall pay a fine of not less than $10 nor more than $100, or may be imprisoned not less than ten nor more than thirty days, or both.

SEC. 12. That the importation of an infectious disease or an insect pest, knowingly, shall be punished by a fine not less than $500 or imprisonment for six months or both.

SEC. 13. All injurious diseases or pests scheduled by the Board are declared a public nuisance.

SEC. 14. The Board may adopt regulations, not inconsistent with the laws of the State and the United States, to prevent the introduction and spread of any such diseases and insect pests.

SEC. 15. The Inspector to receive a salary not exceeding $600; he and his deputies to receive actual mileage, not exceeding $750 a year. The unsalaried members of the Board to be paid their actual traveling expenses and $5 a day for attendance upon the annual meeting. The sum of $2,000 a year to be appropriated to pay the expenses of the Board.

SEC. 16. The Inspector may appoint deputies as may be necessary to carry on his work at a salary of$3 per day, not over $300 a year to be used from the appropriation for this purpose.

SEC. 17. Quarantine guardians appointed by the Inspector shall draw pay at the rate of $2 per day, the same to be paid by the owner of the quarantined premises. They may maintain an action before any Justice of the Peace to collect this amount.

SEC. 18. Fines collected under this act shall be transmitted to the State Treasurer, to be added to the general appropriation made for this purpose.

SEC. 20. Suits to be made in the name of the State of Florida.

## DISCUSSION.

[See minutes, pages 1 to 5, item 48.]

Mr. Stevens: I want to know if this bill is to be left to the Legislature to pass it or not as it, in its wisdom, may see fit. It may be in order for me to tell of a little observation I had on cottony cushion scale in California. It was during the time of the real estate boom. I had only heard of the California red scale. I saw acres of orange trees, whose leaves and even fruit were covered over with it. I asked a prominent nurseryman what it was. He told me its name and said it was due to the climate. He said there was something worse than the red scale. What? Cottony cushion scale. What made that sticky, gummy looking stuff? Cottony cushion scale. It was the most dis-

gusting thing I ever saw caused by scale. I know if the members here have had the experience I did they will try by all means to have this bill passed, and hope that the Legislature will spare neither time nor expense in getting the bill through this session. It is the curse of our State!

Mr. Westlake: It seems to me that the committee on the bill undertakes too much. It imposes duties on the entomologist which it will be impossible for him to perform. It seems to me that in requiring an entomologist to examine all fruit and vegetables sent out of the State, we would require all of his time, especially in the shipping season; his time and his deputies' time.

Another little defect is in the financial article near the close of the bill. I am not a statesman nor a lawyer, but I know that it is not usual to provide for an appropriation. Men who draw up a bill only provide for the expense, and leave the rest to the Legislature.

Mr. Moremen: We want a good strong law or no law at all. I think that the objections urged that the entomologist would have more than he could do are based upon a misconception of the bill. It would not be necessary for the entomologist to examine everything in the State, but when there is anything suspicious he should make the examination. In other words he should ever be on the alert.

Prof. Rolfs: In regard to imperfection; it was the idea to present this to the Legislature as our idea of what a bill ought to be. I might say further, in explanation here, that, as to my card to the members of the Horticultural Society suggesting to them to let the Experiment Station do this work, it has been ruled against by the Federal courts. We cannot appropriate money from the Experiment Station for that purpose. If Floridians wish to have money for this purpose, they must appropriate it from their own treasury.

Dr. Kerr: If such a law is necessary—and we believe that it is—I think that every member of the Horticultural Society should take an interest in writing their Representatives in their respective districts, urging upon them the necessity of such a bill. It would have its effect, and concerted action would bring it about.

---

## GROWING STRAWBERRIES IN FRAMES.

By Prof. H. E. Stockbridge.

If the subject of strawberries is still under consideration I wish to describe an experiment made during the past season which may be of interest to the Society.

The object in view was to hasten the maturity of fruit by protecting the early blooms from the freeze which so commonly ruins them in December or January. For

this purpose a structure was built which I called a strawberry frame. Double walls were built by driving two rows of stakes into the ground about four feet apart and nailing to them rough boards twelve feet in length until a height of four feet was reached, the distance between the rows being two feet. This frame was built in the form of a square, each side of which was twelve feet in length with double walls two feet apart and the corners pointing to the four points of the compass, north, south, east and west, so that each side was subjected to the direct rays of the sun during a portion of the day. These walls both inside and outside were perforated with two-inch auger holes seven inches apart. The space between the inner and outer walls was filled with soil mixed with compost and made rich with chemical fertilizers. Three-inch drain tile were placed on end at distances of three feet apart as the earth was filled in, one tile being placed end to end on top of another as the space was filled. The bottom was filled with moss pounded in solid to prevent the easy passage of water through the same so that these tile, when filled with water, became reservoirs of moisture which percolated slowly into the surrounding soil, keeping the same constantly moist. Strawberry plants were then set in the auger holes through the wooden walls. An opening was left at the northern apex of the frame to allow passage to the interior of the same. The structure thus described accommodated about 600 plants which took root easily, grew thriftily and yielded bountifully.

As a matter of comparison, plants of the same varieties were transplanted the same day and with essentially the same treatment into a bed with slatted covering and one adjoining in the open. The result was that the plants on the frame grew more rapidly and bloomed earlier than in either of the other cases. The first fruit was picked from the frame on February 7th, fully three weeks earlier than would have been the case under shade. The actual final comparison was, of course, spoiled by the freeze of February 13th, which ruined all blooms and fruit although the plants themselves in each case escaped.

Four advantages, it seems to me, are presented by this method of strawberry protection.

1. Although the frame itself requires some little expenditure, all subsequent cultivation is absolutely avoided, so that the cost of production in this way is really diminished and the fruit is of a very superior quality being necessarily free from sand and requiring no mulching.

2. A gain of about three weeks in date of maturing is secured, which, of course, means highest prices for the product.

3. The shape of the structure facilitates easy covering with paper or cloth as proteciton against moderate cold.

4. Such a frame can be cheaply and easily constructed in a very limited space so that residents upon town lots by this means can produce their own fruit which would not be possible with level culture.

The method is, of course, circumscribed by limitations and cannot be recommended as a commercial method upon a large scale. It is believed, however, that it has very material advantages for individual producers, particularly as a means for securing early fruit in an economical way. It will, of course, be recognized that the method is not entirely new as it utilizes the particular characteristic of the so-called barrel method

of cultivation. It is believed, however, to be in every way more economical and effective than this method, indeed the latter method is not believed to possess utility for practical growers.

## DISCUSSION.

[See minutes, pages 1 to 5, items 56 and 57.]

Mr. Putney: I want to say that strawberries can be grown on high pine land. My strawberries are on high land, and I have always been able to get a good crop there. Just after the freeze of 1895, Mr. Roby, of Lake county, put out a moderate sized bed on high pine land, well fertilized, and sprinkled them with the hose—Lady Thomson variety. They made good fruit, and have been successful nearly every season.

Last winter at Avon Park there were beautiful beds of strawberries grown with no other irrigation facilities than a watering pot. They are very successfully grown, and they get enough strawberries for home use, though they are too far from a railroad to ship to market.

If you can get enough fertilizer, and a head of water—or a sprinkling pot and have the muscle to carry the water—you are sure to have plenty of strawberries.

I think the three best varieties are the Hoffman, Newnan and the Lady Thompson.

Mr. Westlake: I have seen the same result obtained by boring a barrel full of holes around the side. It is not only good, but ornamental.

Mr. Putney: I want to endorse the Lady Thompson as a good strawberry. You can have berries, as far down as Lake county, from the 9th of December to the 4th of July, if you have plenty of manure and moisture.

### CANES AND UMBRELLA STOCKS.

Mr. Schmelz: I wish to speak on another subject—walking canes and umbrella handles. In Germany they have quite a systematic industry in this line. Bamboo canes are supposed to come from Japan, but in reality they come from Georgia. I find that it is cheaper to grow an article like that than it is to go into the woods to find it. Now, I would suggest the growing of the wood known by the German name of weichsel, probably the mahaleb cherry. It retains its fragrance, and the best is grown in Hungary. They train the young shoots so that they produce switches with a right angle, suitable for long canes and umbrella handles. There is a great deal to be learned. I know some people who have been in the business. The principal point is to succeed in retaining the fragrance of the wood. A party in New Jersey grew some but did not make a success in retaining the fragrance of the wood. Some grown in Kentucky was very good. I tried it in a small way before 1895. They were in demand. If anyone has had any experience in this line I would like to hear from him. There is more in this industry than you might think. Also in the making of pipe stems. Every piece of them is utilized.

# FIGS.

## Discussion.

[See minutes, pages 1 to 5, item 60.]

Mr. Putney: I should like to know the names of two or three varieties which will succeed as far south as Tampa.

Mr. Hampton: I have had some experience for the past six years. While I have not been entirely satisfied with my success, others think I have been quite successful. The Department of Agriculture has furnished us with the names of the White Adriatic and White Marseilles. These can be grown quite successfully. In 1895 I sent some to Atlanta. Six of them were crowded to get into a jar. I think the Marseilles is better than the Adriatic. Remember to put on as much fertilizer as your conscience will allow; give them shallow culture and plenty of ashes, and then you will have figs. My White Marseilles is now loaded with fruit. The Brown Turkey is also loaded. The White Adriatics have not all come out yet.

President Taber: Ever tried the Brunswick?

Mr. Hampton: No, I have never tried the Brunswick. My neighbor at Avon Park had, four or five years ago, some Brunswicks which did nobly. As far as I can see without trying it, it is good. I prefer it to the Black Prolific (?) which, however, is good, especially for drying.

Mr. Westlake: I have had some White Adriatics for a number of years. They don't bear for me; I don't know why. I had about made up my mind to cut them down.

Mr. Putney: Are there any figs on the sub-peninsula?

Mr. Neeld: We have abandoned them altogether. When we first came to the peninsula there were some, but we have abandoned them.

Mr. Putney: The reason I asked that question is that we were furnished with figs last year from California.

Mr. Hampton: The White Adriatic is an excellent keeper. It is safe in handling, and I never knew it to spoil.

# GRAPES.

**The Scuppernong—a Desirable Variety for Florida.**

Dr. E. E. Pratt, Limona, of the Standing Committee.

[See minutes, pages 1 to 5, items 61 and 62.]

Since coming to Florida I have done very little in the way of either growing or eating grapes, excepting a few Scuppernongs. Every one has Scuppernongs, or ought to have, for their own use. It seems to be at home in Florida sand and climate, but is not a marketable grape. The juice is there, however, and Mr. Bacon descanted very "cordially" upon its merits two years ago. In regard to the Scuppernong, please allow me to read an extract from the Alabama State Bulletin on the subject:

THE SCUPPERNONG FAMILY.

This is peculiarly a child of the South, which has hitherto been sadly neglected. Men are prone to overlook blessings by which they are immediately surrounded while searching abroad for those less to be desired but enchanting in the distance.

The scuppernong is the only variety of this type usually planted, very few farmers being aware that there are others very much its superior.

In 1886 eight varieties were planted twenty feet apart in rows, along the margin of a branch, and trained upon a trellis of three wires. The vines have been annually pruned by spurring back the canes of the growth of the previous season to six inches.

This type must be pruned in autumn, just after the leaves fall. If pruned later there is danger of destructive bleeding. This method of training places the crop of fruit within easy reach, increases the size of the berries and bunches, and insures a larger yield of grapes of better quality.

The Thomas commences to ripen August 15th, thus continuing the supply from the vineyard of the other types. Other varieties ripen in succession until the middle of September, and furnish fruit until October.

The Memory and Mish are especially desirable, combining the good qualities of vigorous growth, hardiness, productiveness and very superior quality.

Desiring to secure the verdict of as large a jury as possible, very many visitors were taken through this vineyard for the purpose of comparing the varieties. Without exception the Memory and Mish were pronounced superior to the Scuppernong. Of the ten varieties compared, the Memory is by far the most vigorous grower.

All are free from disease except an occasional very slight attack of black rot. The

proximity of diseased vines of other types may have furnished the spores for the disease.

To propagate this type, use long cuttings, taken in October or early in November, or layer the vines at any time from October to March.

The tabulated statement sufficiently describes the characteristics of these varieties, except as regards adhering to the stem.

The Scuppernong, James and Jeter drop so readily from the bunch as to cause great waste in gathering. The stem is attached to the berry externally. The Thomas, Memory and Scuppernong seedling do not shed so readily, though attached externally The Flowers, Flowers Improved, Mish and Tenderpulp adhere firmly to the bunch, having the stem attached internally. These last named varieties are gathered and shipped in bunches as readily as Concord or Ives.

The Mish and Memory are both rated best as to quality, though they differ in many respects. The Memory is best in flavor and the Mish best in sweetness. The Memory produces a very large berry, while the Mish is small. Both continue long in season.

---

So much for the Scuppernong, but the more tender varieties of grapes do not seem to like Florida. Most of them are subject to mildew, and still will persist in ripening their fruit right in the season of the year when moisture abounds and the mildew is in its element. The Niagara is an exception and shows a little more sense by getting its fruit mostly out of the way before the moist, soft time comes on. But that grape has not so far been financially a blooming success. Possibly it blooms enough, and we might perhaps better say, a market success. It is a market grape that we want, and two prominent conditions confront the grape grower of Florida which must be overcome before complete success can crown his efforts.

The first is the general lack in the soil—that principal lack being potash; and the other is fruiting in the rainy season already mentioned. The first can be remedied by putting the potash there, but that is expensive. We may hold the second under control by intelligent, judicious and persistent use of the spray. I say persistent, for it certainly needs persistence in our rainy season. This, too, calls for labor and expense, and grapes, like everything else, to be of a financial success must be produced cheaply.

Would it be possible for our friend, Prof. Webber, and his co-workers, to find or produce a grape which would fill the commercial or market requirements, with immunity from disease, and a disposition to grow in our Florida sand and produce enormous crops, a hard, thrifty, desirable grape which would fruit before our rainy season? They have accomplished wonders in other lines, they might possibly do something as marvelous in this.

I have read recently that the Agricultural Department has brought several new varieties from the Mediterranean and will try them in the South. It is to be hoped that this effort may give us something well adapted to our soil and climate.

### REMARKS BY PROF. WEBBER ON CROSS BREEDING.

In reference to cross breeding—in grape growing this has had wonderful results. Some of our grapes are immune from black rot. From long experience some of our grapevines have been rendered immune

from the disease known as phylloxera. In France the vines are not free from phylloxera. French horticulturists say that they have produced varieties which have this combination to a wonderful extent. I am very much interested in this question. It seems to me to be in the power of horticulturists to develop fruits which are really superior.

## TROPICAL FRUITS.

### Discussion.

[See minutes, pages 1 to 5, item 65.]

Mr. Richards: I would like to know if any gentleman present understands the budding of mangoes?

Mr. Neeld: In 1893 Mr. Butler and I succeeded in budding some mangoes, but they were killed by the cold before they had time to sprout and make any growth. They are budded just like an orange, and covered with waxed paper. There is much more difficulty than in budding oranges.

Prof. Webber: In regard to the budding of mangoes, and also other tropical fruits—like the guava—there has been no question as to whether it can be successfully done. As far as mangoes are concerned, they have been budded by Prof. Gale, of West Palm Beach. I have seen as many as two hundred buds. But they cannot be budded in the spring in this section. He buds almost altogether in December. He gets a stock of them, and after inserting them he fastens them in, and as far as possible protects the young, developing bud from bugs. By some experiments in budding guavas, I feel certain that the guava can be budded in December and January and the bark will slip very much better then than at any other season of the year.

Mr. Neeld: That recalls old times. We used to have all those trees with us, but I will say to the Society that only the avocado pear and the mango proved a great success. The mango is more productive, on the whole, than the avocado pear, but there are two great difficulties to contend with. First, that the market of the country did not know what a mango was, and although we grew a few boxes, it was enough to supply the United States. Prof. Rolfs was there and took a picture of the mango and avocado pear trees. We had Mr. Swingle come down and investigate the bloom blight, but the freeze came before they had gone far enough in their experiments to make anything out of it. So we gave them up willingly on two accounts, first, that the market did not know what they were, and that they were unprofitable.

But I can tell you the children liked them! When I would come home with my horse and buggy after a tiresome ride, I was not much better than the children. I would call one of the boys to take care of the horse, and make for the mango tree. That industry went up like a rocket and came down like a stick.

Mr. Crane: In Boston one can get $2.00 per orange box for mangoes. There ought to be something in it.

Mr. Neeld: We had every assurance from the commission men in New York City that tney could place all the mangoes we could produce, at $1.00 per dozen. We shipped thousands of boxes, distributed to every place in the United States. The outcome of that shipping was that we organized a shipping association, and the prices we realized per box was 35 cents instead of $15.20 as we expected.

Mr. Putney: I can endorse what Mr. Neeld says in favor of the mango. On my visit to the Bahamas I found that the favorite fruit was mangoes. Last summer in New York I studied out the situation. We cannot ship Japan persimmons, but California does it. The California persimmons are not nearly as good as the Floridas. We should not give up, but keep on and raise persimmons and mangoes and get them into market.

Mr. Neeld: If we had as many lives as a cat we might do it; but we have only one life.

Mr. Harrington: I have a neighbor who had five acres planted in mangoes. He shipped about one thousand boxes, and he used tomato crates holding sixty-four quarts. They netted him about $2.00 per box, or $2,000.

Mr. Gurney: The taste for mangoes is an educated taste. Some are very turpentiney in flavor.

## HARDY SHRUBS AND TREES.

**Ornamentals Suitable for South Florida.**

E. N. Reasoner, Oneco, of the Standing Committee.

[See minutes, pages 1 to 5, item 73.]

The recent cold weather having damaged plants and trees over a great portion of Florida, makes it expedient to carefully select subjects for ornamental planting, and your committee will briefly touch on some hardy plants desirable for the great central part of the State. As with all vegetation, ornamentals suffered more or less by the severe cold of February last, and only the most hardy came through uninjured. The hardy shrubs of the north are not as a rule suitable for growing in Florida, and we find but few grown; of course these were unhurt by freezing and the early flowering sorts have been blooming during the spring. Among the best of this class are spiraeas, deutzias, calycanthus, weigelias and Philadelphus, which are all deciduous. Another hardy deciduous shrub is the indispensable crape myrtle, in four distinct varieties—white, pink, purple and crimson.

Among the best hardy evergreen shrubs may be placed the magnolia fuscata, raphiolepis ovata, olea fragrans, ligustrum amurense, gardenia Florida, pittosporum tobira, laurus nobilis, myrtus com-

munis, euonymus in variety, tree box, yuccas in variety, camellia japonica and jasminum revolutum. Coniferous evergreens should be treated as a distinct class, and there are many that are desirable, in both shrubs and trees. The following are of satisfactory growth on any well drained soil, and will withstand sharp freezing: Callitris robusta, cypress pine of Australia; cedrus deodara, great cedar of the Himalayas; cephalotaxus fortunei, a dwarf Chinese shrubby conifer; cryptomeria japonica, Japanese cedar; cupressus, or true cypress in a number of species all of fine habit and mostly quick growth; libocedrus decurrens, white cedar of California; retinospora, the Japanese cypress, in variety, all more or less dwarf; and thuya, the arborvitae, in considerable variety; the latter genus contains the most valuable subjects for hedge purposes, for both ornament and use.

The best hardy shade trees are selections from our native forest growth, especially magnolias, bays, oaks, holly, elm, Carolina laurel, cherry and gum, supplemented by a few exotics, such as the umbrella China tree, Chinese soap tree, camphor and Japanese varnish tree.

In palms the most hardy are three or four species of cocos, notably, Alphonsii, or Belair palm; Chamaerops humilis, of Europe, C. hystrix, our native species; latania borbonica, Chinese fan palm; phoenix canariensis, Canary Island date; sabal palmetto, our native tree palmetto, and the gigantic Mexican palmetto, sabal Mexicana. These have passed through most severe freezing without damage, even to the young leaves. After palms come bamboos in considerable variety of hardy sorts, and mostly natives of China and Japan; among the most common may be mentioned Arundo donax variegata, the variegated reed; arundinaria falcata, bambusa argentea, B. metake, B. verticillata, B. violescens and phyllostachys aurea. These are elegant tropical-appearing plants, some attaining great size and of remarkable beauty.

A list of good hardy plants would not be complete without a number of vines, and the following are all of a desirable nature: Carolina "yellow jessamine," wistarias in variety, rhyncospermum jasminoides, the so-called "star-jasmine;" bignonia alba ampelopsis veitchii, the Boston ivy; Kenilworth or English ivy; tecoma radicans, honeysuckles in variety, bignonia capreolata euonymus radicans, and the Cherokee and Macartney roses. Roses as a class are usually hardy and are seldom injured, either in shrubbery or climbing varieties.

There are hosts of tuberous or bulbous-rooted plants easily grown which are not damaged materially by severe cold, among which are all aquatics, crinums in variety, pancratiums, cannas, phrynium, hedychium, heliconias, amomum cardamomum, alocasias, caladiums, amaryllis, iris and many others, all of easy growth and desirable.

The tropical plants which can be planted out in Florida and are sure to sprout up again after freezing, making a show of foliage or flowers during the summer and autumn are many and valuable; a list of them could be carried up into hundreds of species, in vines, shrubs and small trees.

Along the lower coast regions and through parts of the interior the more tender plants ordinarily hardy well up into the State, are uninjured by cold; the most prominent are oleanders, jessamines, roses, myrtles, plumbagoes, tecomas, murraya exotica, meyenias, hydrangeas, galphimia nitida, durantas, clerodendrons, cestrums, bauhinias, ardisias, acacias, agaves, etc.

Strictly tropical growths as allamandas, hibiscus, acalyphas, crotons, dracaenas, pandanus, aralias, panax, justicias, jacaranda mimosaefolia, poincianas, hamelias, ficus, bougainvilleas, aloes, with many others, combined with tropical plants, bamboos and elegant exotic shade trees are doing well on the extreme coasts and adjoining islands.

Your committee has not been able to make a thorough report and trusts the suggestions may bring out valuable discussion.

## DISCUSSION.

[See minutes, pages 1 to 5, item 74.]

Mr. Putney: This matter of ornamentals should be considered at least. I was very much struck by a visit to a town in Florida whose promoters understand very thoroughly the matter of ornamenting the streets. I speak particularly of the shade trees,and how well they were adapted to the place. They were water oaks, and instead of being planted on the sidewalks, the main street was planted in double rows down the center. They were ornamental and useful, as sidewalks passed through the double rows. There was shade at all times of the day. Another aspect of this plan is this, that the trees for shade being planted down the center of the road do not come into competition with the orange trees, or other fruit trees. I would suggest that you place your shade trees where they will do no harm to your fruit trees.

Dr. Kerr: In regard to the subject of ornamentals; there is no doubt that this is a vital question, and one to which our members, and indeed, all the people of Florida engaged in horticulture, floriculture, etc., are to a great extent indifferent. It was said before the Philadelphia Exposition in 1876 that we were a nation of shopkeepers and knew nothing of art—which was true. Since that time great efforts have been made in the Northern States toward filling up that gap, and there is reason to believe that conditions in that respect have been very much changed for the better.

There is no doubt that the young are greatly impressed by their surroundings, and if we look around us in the country we see houses which have been standing twenty, thirty, forty and fifty years,without a shrub, rose bush or anything of the kind to break the dull monotony. If we ask why there is a scarcity of such things, they say, "they are useless—no good—don't produce anything to eat." And their children grow up under these influences. We should encourage these ornamentals, so that our children shall grow up more beautiful in their natures.

Mr. Bacon: I am very glad to hear these remarks on ornamentals. I should be very sorry to have this meeting pass through without having it brought up. There is a plenty of money-getters, but not enough people who are paying sufficient attention to their home surroundings. Keep the children at home, and make them remember that it is a place of beauty. Ornament the home with plants and flowers and beautify

the surroundings. We should do more to encourage the improvement of the State in this respect. Mr. Flagler has set us a good example.

## PINEAPPLE FERTILIZERS.

**Geology and Soils of the Lower East Coast—Discordant Views of the Growers—Interesting and Valuable Tests Instituted by the State Experiment Station—Great Number of Formulae Tried.**

Preliminary Talk by Professor P. H. Rolfs, of the State Experiment Station, Lake City.

[See minutes, pages 1 to 5, item 66.]

Pineapple growing in Florida on an extensive scale is probably the youngest branch of horticultural industry in the State. For many years the growing of pines on a commercial scale was confined to the Keys and the West Indies. Various attempts were made to grow pineapples on the main land of Florida, but these all proved more or less unsuccessful. I will not attempt to enumerate the causes for failure in this direction, but I may be permitted to mention in passing that the extension of the railroad down the East Coast is by no means the least important factor in developing this industry in that section. Of course pineapples were grown at various points along the East Coast before railroad communications were established, but the industry was carried on on a limited scale. The rapid transportation of fruit to Northern markets has stimulated the production.

### GEOLOGICAL ORIGIN OF THE SOIL.

Geologists tell us that only a few periods of geological history have passed since Florida began to be. They tell us that the whole southern extremity of Florida, especially along the East Coast, has been gradually brought out by the sea. Coraline deposits in the ocean grew high enough to arrest the waves and form breakers. Upon these were deposited sand which finally grew high enough to make bars and islands. By the action of the wind the sand was carried higher, making our spruce pine land. By visiting our beaches we may see today where new land is being formed. This is bound into place and retained by the action of the beach plants, such as morning glorys and grasses. After these have flourished for a period of years the soil finally becomes suitable for palmetto scrub. After many years of growth the palmetto scrub adds enough humus to the soil to permit the spruce pine to form a forest. After these have grown for many decades the wood, falling limbs, cones and debris generally give fertility enough to the soil to grow scrubs—either the pine scrub, the hickory scrub or some other form.

### PINEAPPLE LAND.

In pineapple growing as in other forms of horticulture the tiller of the soil has had

to learn by dear experience what kind of land was best adapted to this particular crop. Our veteran pineapple grower, Capt. Richards, has told us repeatedly how he attempted to grow pineapples upon the moist and fertile island soil. Finally ending in failure and almost despair, he planted a few upon the sandridge on the west bank of Indian river at Eden. To his surprise this soil proved exactly what the pines wanted. From this small beginning we may say that practically the whole pineapple industry on the spruce pine land of the Indian river section had its origin.

### FERTILIZERS.

In visiting the various sections of the Indian river country during 1897 diligent inquiries were made of the principal pineapple growers as to what forms of fertilizer they would recommend for use on pineapples. The inquiry ended in finding out that very few people agreed on using the same fertilizing substances. Those who mixed their own fertilizers seemed to be as much in doubt in regard to the action of particular substances as any one else. By far the greater number of pineapple growers, however, seemed to be depending upon ready mixed formulae for their use, the composition of these being in no case known. While the fertilizer houses always appended the percentage of nitrogen, potash and phosphoric acid present, there was no evidence as to the origin of the nitrogen, potash or phosphoric acid.

A few points in connection with fertilizing pineapples seem to be admitted by a considerable number of pineapple growers. However, there was no one form of nitrogen which was accepted by a majority of the extensive growers; and the same was true of potash and phosphoric acid. It was not difficult to find pineapple growers of more than local reputation who would condemn a certain form or forms of ammonia, and their neighbors would condemn certain other forms and probably advocate the use of the forms condemned by the first neighbor. By compiling the opinions of various growers every form of ammonia was condemned and the opposite of the proposition was also true; that is, every form of ammonia had its advocates. The same was true of potash. Acid phosphate was quite generally considered a bad fertilizer. Of course everybody fertilized and everybody was dissatisfied with the action of certain forms of fertilizers. Very few were entirely satisfied with the forms of fertilizer that they were using, and the greater number of those who were satisfied with their fertilizer were people who had not been in the pineapple business very long.

### OBJECTS OF THE EXPERIMENTS.

At this juncture the Experiment Station offered to set aside a certain amount of money from the Hatch fund to conduct experiments on a sufficiently extensive scale that they might be of value to the pineapple growers. Application was made to various people interested for help in this connection. The Experiment Station agreed to purchase all fertilizers and superintend their application. The owner of the field was to furnish the labor to cultivate it and receive the fruit when it had ripened on the field. Under these conditions many acres of pineapples were offered for experimental use. After making diligent inquiry into the condition of the fields and of the soil, it was finally decided that a field belonging to Ballentine & Moore, a mile north of Jensen, was the most suitable for the experiment work. Accordingly the work was com-

menced on the field, which had been set out in pineapples the previous July or August on recently cleared spruce pine land. Chemical analysis of the "pineapple soil" indicates very strongly that all the essential elements of fertility are wanting in it. Consequently it was thought that no plots would produce a good crop with an incomplete fertilizer. Therefore, the plots receiving an incomplete fertilizer were laid out in hundredth-acres, and plots receiving complete fertilizers were laid out in twentieth-acres. As many forms of nitrogen as were common on the market were secured; also of potash, bone meal and dissolved Florida phosphate. Each form of nitrogen was combined with each form of potash and conversely. The phosphoric acid was used in this connection as extensively as the fund would permit.

The fertilizers used give approximately the following formula:

Nitrogen.....3 per cent
Potash.....7 per cent
Available phosphoric acid.....5 per cent

The following amounts of fertilizers were applied February 7 and 8, 1898. A second application of two and a half times that amount was made June 27 nd 28, 1898. A third application of one and a half times the amount was made November 4 to 12, 1898, at which time the photographs were taken.

| Plot. | Ingredients. | Lbs. per Acre. |
|---|---|---|
| 1 | Cotton Seed Meal | 800 |
| 2 | Cotton Seed Meal | 800 |
| | Sulphate Potash, low grade | 400 |
| 3 | Cotton Seed Meal | 160 |
| | Sulphate Potash, low grade | 400 |
| | Bone Meal | 1,600 |
| 4 | Cotton Seed Meal | 160 |
| | Bone Meal | 1,600 |
| 5 | Cotton Seed Meal | 800 |
| | Sulphate Potash, low grade | 400 |
| | Acid Phosphate | 600 |
| 6 | Cotton Seed Meal | 800 |
| | Acid Phosphate | 600 |
| 7 | Cotton Seed Meal | 800 |
| | Muriate Potash | 200 |
| 8 | Cotton Seed Meal | 160 |
| | Muriate Potash | 160 |
| | Bone Meal | 1,600 |
| 9 | Cotton Seed Meal | 800 |
| | Muriate Potash | 160 |
| | Acid Phosphate | 600 |
| 10 | Cotton Seed Meal | 800 |
| | Kainit | 800 |
| 11 | Cotton Seed Meal | 160 |
| | Bone Meal | 1,600 |
| | Kainit | 800 |
| 12 | Cotton Seed Meal | 800 |
| | Kainit | 800 |
| | Acid Phosphate | 600 |
| 13 | Cotton Seed Meal | 800 |
| | Pot., Mag., Carb | 500 |
| 14 | Cotton Seed Meal | 800 |
| | Pot., Mag., Carb | 500 |
| | Bone Meal | 1,600 |
| 15 | Cotton Seed Meal | 800 |
| | Pot., Mag., Carb | 500 |
| | Acid Phosphate | 600 |
| 16 | Cotton Seed Meal | 800 |
| | Sulphate Potash, high grade | 200 |
| 17 | Cotton Seed Meal | 160 |
| | Sulphate Potash, high grade | 160 |
| | Bone Meal | 1,600 |

| Plot. | Ingredients. | Lbs. per Acre. |
|---|---|---|
| 18 | Cotton Seed Meal | 800 |
| | Sulphate Potash, high grade | 160 |
| | Acid Phosphate | 600 |
| 19 | Am. Sulphate | 200 |
| 20 | Am. Sulphate | 200 |
| | Sulphate Potash, high grade | 200 |
| 21 | Am. Sulphate | 40 |
| | Sulphate Potash, high grade | 160 |
| | Bone Meal | 1,600 |
| 22 | Am. Sulphate | 40 |
| | Muriate Potash | 160 |
| | Bone Meal | 1,600 |
| 23 | Am. Sulphate | 200 |
| | Muriate Potash | 160 |
| | Acid Phosphate | 600 |
| 24 | Am. Sulphate | 40 |
| | Kainit | 800 |
| | Bone Meal | 1,600 |
| 25 | Am. Sulphate | 200 |
| | Kainit | 800 |
| | Acid Phosphate | 600 |
| 26 | Am. Sulphate | 200 |
| | Pot., Mag., Carb | 500 |
| | Acid Phosphate | 600 |
| 27 | Sodium Nitrate | 280 |
| 28 | Sodium Nitrate | 280 |
| | Sulphate Potash, high grade | 200 |
| 29 | Sodium Nitrate | 280 |
| | Sulphate Potash, high grade | 160 |
| | Acid Phosphate | 600 |
| 30 | Sodium Nitrate | 280 |
| | Muriate Potash | 160 |
| | Acid Phosphate | 600 |
| 31 | Sodium Nitrate | 280 |
| | Sulphate Potash, low grade | 400 |
| | Acid Phosphate | 600 |
| 32 | Sodium Nitrate | 280 |
| | Kainit | 800 |
| | Acid Phosphate | 600 |
| 33 | Sodium Nitrate | 280 |
| | Pot., Mag., Carb | 500 |
| | Acid Phosphate | 600 |
| 34 | Blood and Bone | 680 |
| 35 | Blood and Bone | 680 |
| | Sulphate Potash, high grade | 160 |
| 36 | Blood and Bone | 680 |
| | Sulphate Potash, low grade | 400 |
| 37 | Blood and Bone | 680 |
| | Kainit | 800 |
| 38 | Blood and Bone | 680 |
| | Muriate Potash | 160 |
| 39 | Blood and Bone | 680 |
| | Pot., Mag., Carb | 500 |
| 40 | Cotton Seed Meal | 800 |
| | Sulphate Potash, high grade | 160 |
| | Acid Phosphate | 600 |
| | Lime, air slaked | 1,000 |
| 41 | Sodium Nitrate | 200 |
| | Kainit | 800 |
| | Acid Phosphate | 600 |
| | Lime, air slaked | 1,000 |
| 42 | Am. Sulphate | 200 |
| | Sulphate Potash, high grade | 160 |
| | Acid Phosphate | 600 |
| | Lime, air slaked | 1,000 |
| 43 | Blood and Bone | 700 |
| | Pot., Mag., Carb | 500 |
| | Acid Phosphate | 600 |
| | Lime, air slaked | 1,000 |
| 44 | Cotton Seed Meal | 800 |
| | Sulphate Potash, high grade | 200 |
| | Acid Phosphate | 600 |
| | Muck, air dried | 10,000 |

| Plot. | Ingredients. | Lbs. per Acre. |
|---|---|---|
| 45 | Sodium Nitrate | 280 |
| | Kainit | 800 |
| | Acid Phosphate | 600 |
| | Muck, air dried | 10,000 |
| 46 | Am. Sulphate | 200 |
| | Sulphate Potash, high grade | 200 |
| | Acid Phosphate | 600 |
| | Muck, air dried | 10,000 |
| 47 | Blood and Bone | 700 |
| | Pot., Mag., Carb | 500 |
| | Acid Phosphate | 600 |
| | Muck, air dried | 10,000 |
| 48 | Am. Sulphate | 50 |
| | Pot., Mag., Carb | 500 |
| | Bone Meal | 1,600 |
| | Lime, air slaked | 3,000 |
| | Muck, air dried | 10,000 |
| 49 | Am. Sulphate | 200 |
| | Sulphate potash, high grade | 400 |
| | Acid Phosphate | 600 |
| 50 | Am. Sulphate | 40 |
| | Sulphate Potash, low grade | 400 |
| | Bone Meal | 1,600 |
| 51 | Am. Sulphate | 200 |
| | Sulphate Potash, low grade | 400 |
| | Acid Phosphate | 600 |

Plots 1to 18, 40 and 44 have cotton seed meal as a source of nitrogen. Plots 19 to 26, 42, 46, 48 to 51 have sulphate of ammonia as a source of nitrogen. Plots 27 to 33, 41 and 45 have nitrate of soda as a source of nitrogen. Blood and bone were applied to plots 34 to 39, 43 and 47. High grade sulphate of potash was applied to plots 16, 17, 18, 20, 21, 28, 29, 35, 40, 42, 44, 46 and 49. Low grade sulphate of potash was applied to plots 2, 3, 5, 31, 36, 50 and 51. Kainit was applied to plots 10, 11, 12, 24, 25, 32, 37, 41 and 45. Muriate of potash was applied to plots 7, 8, 9, 22, 23, 30 and 38. Magnesium-potassium carbonate was applied to plots 13, 14, 15, 26, 33, 39, 43, 47 and 48. Bone meal was applied to plots 3, 4, 8, 11, 14, 17, 21, 22, 24, 48 and 50. To this should be added plots 34 to 38, 43 and 47 which were treated with blood and bone. Acid phosphate was applied to plots 5, 6, 9, 12, 15, 18,23, 25, 26, 29, 30, 31, 32, 33, 40 to 47, 49 and 51. The accompanying photographs are illustrations of plots, which under the usual, accepted conditions of the fertilizer man, should give exactly the same growth of pineapples. That is, the endeavor has been to give to every plot represented as much ammonia as any other plot received, and the same in regard to potash and phosphoric acid. (Excepting in cases of incomplete formulae.) In comparing the above notes the reader will notice that the different forms of potash were placed as nearly contiguous as the circumstances allowed. Therefore, the conclusions reached in regard to potash in this experiment must be considered as being the most satisfactory. The appended table will give the plots in such a way that they may be compared with one another to better advantage:

NO. 1.

NO. 4.

NO. 2.

NO. 5.

NO. 3.

NO. 6.

| | Potassium Sulphate High Grade. | Potassium Sulphate Low Grade. | Kainit. | Muriate Potash. | Potassium Magnesium Carbonate. |
|---|---|---|---|---|---|
| Cotton Seed Meal and Bone Meal | 17 6th Class | 3 4th Class | 12 6th Class | 8 3rd Class | 14 4th Class |
| Cotton Seed Meal and Acid Phosphate | 18 6th Class | 5 5th Class | 11 3rd Class | 9 4th Class | 15 4th Class |
| Am. Sulphate and Bone Meal | 21 3rd Class | 50 2nd Class | 24 3rd Class | 22 4th Class | 48 3rd Class |
| Am. Sulphate and Acid Phosphate | 49 2nd Class | 51 2nd Class | 25 6th Class | 23 6th Class | 26 3rd Class |
| Sodium Nitrate and Acid Phosphate | 29 5th Class | 31 2nd Class | 32 4th Class | 30 5th Class | 33 5th Class |
| Blood and Bone | 35 1st Class | 36 1st Class | 37 1st Class | 38 1st Class | 39 1st Class |
| Blood and Bone and Acid Phosphate | | | | | 43, 47 2nd Class |

EXPLANATION OF THE TABLE.

The above table shows the composition of the fertilizer applied to each plot and the class to which each plot belonged in December, 1898.

The plots marked 1st class were better than what one is accustomed to find in pineapple sections. Plots marked 2d class would pass for fine. 3d class good. 4th class indifferent, with some spiky plants. 5th class poor, with considerable percentage of spiky plants. 6th class, practically worthless, over 40 per cent spiky, and the rest doing poorly.

EXPLANATION OF THE PLATE.

Views of typical plots belonging to each of these classes are represented on the accompanying plate.

These plots, it will be noticed, are contiguous. Nos. 24 and 25 show the most striking contrast—the former belonging to 3d class and the latter to 6th class. Enough of the field is in the photograph to show the step from plot 23 to plot 24 and again from plot 24 to plot 25. The row between plots 23 and 24 in which the label stands is fertilized on the right side by formula No. 23, and the left by formula No. 24, and it will be noticed that the size of the plants is about the average of the two. A similar observation may be made regarding the label row between plots 24 and 25.

CONCLUSION.

Ammonia.—For young pineapple plants growing on spruce pine land which has not been fertilized before, blood and bone furnish the best form of ammonia used. Nitrate of soda comes next to blood and bone,

but there is a strong difference and a considerable step between these two. Bright cottonseed meal gave better results than sulphate of ammonia. Our experiments, therefore, seem to indicate that as a source of ammonia, blood and bone stand first, nitrate of soda second, cottonseed meal third, and sulphate of ammonia fourth of the substances with which we have experimented.

Potash.—While there is a great variation in the different plots treated with different forms of potash there seems to be a greater difference due to the combination than to any particular form of potash. Summing up the whole and noting the character, we find that potassium-magnesium carbonate proved the most efficient. Low grade sulphate of potash, frequently called the double potash salts, stands second in the list. While none of its plots are unusually good, it has the good character of having very few poor plots. High-grade sulphate of potash stands slightly below low-grade sulphate of potash in the potash list. Muriate of potash stands fourth in the list when all of its combinations are considered, in spite of the fact that the best plot in the field was fertilized with muriate of potash.

Phosphoric Acid.—As a whole, the experiments indicate that a small amount of soluble phosphoric acid will suffice. Acid phosphate is decidedly an unprofitable fertilizer in nine-tenths of the combinations. Its bad effects cannot be ascribed to the presence of sulphuric acid or other caustic material. Bone meal has shown itself a very efficient substance.

No fertilizer ingredient used in the above experiments is absolutely bad in itself, but becomes bad by being combined with certain other forms. The detrimental effect of the fertilizers cannot be said to be due to some caustic substance in the combination. The facts accumulated are not sufficient to warrant any further conclusions to be drawn.

## MARKETING FRUIT.

### A Discussion.

[See minutes, pages 1 to 5, item 77.]

Mr. Putney: I have been shipping to New York for thirty years and wanted to keep in touch with their markets. I was quite familiar with them; my father was a commission merchant there when I was quite a small boy. My first experiences were with a very wise man in regard to marketing. It was my good fortune to start out right. He stood over me all day while I did the packing of all sorts of fruits, from strawberries to apples. When I came to Florida I thought I knew considerable about marketing, and nave been successful in getting my goods to New York in pretty good shape. But I have concluded that I did not know much about it. It has been said in some of these discussions that certain fruits were not appreciated. Last summer I learned why. For instance, the mango and Japan persimmons. Last summer I was in New York, and I opened a fancy fruit store in a town of about twelve hun-

dred inhabitants. I had Florida fruits—early grapes and Japan persimmons—and wanted to boom Florida fruits. This was a village on the Hudson river where there are a great many wealthy people. Fancy pineapples at 35 cents and 50 cents would not sell. Did not take. I could not understand it. We had peaches and early grapes. I could not understand why I could not sell fancy pineapples, every one of them at 40 cents. I put the price down to less than they cost me—35 cents. I could not sell even at that to any extent.

The great majority of people—even some of the well-to-do, when they cannot supply their summer table with fruit for 12 to 18 cents, will go to dried fruit. They will not buy the fresh at high prices. We want to place the great bulk of our fruit in the market so that an ordinary family can supply their evening table for 12, 15 and 18 cents—or a 25 cents limit. We had some very fine grapes which came from California, 40 cents per basket. We could not sell them. They were selling in New York City at $2.00 per crate. They were beyond the reach of the individual buyer. I paid dearly for just a little bit of knowledge. It cost me $25 or $30. I did not get rich in the fancy fruit business. The demand is very limited. I bought a crate of small pineapples from the East Coast, forty or fifty in a crate. I offered them just above cost, 7 cents apiece. Fine peaches were in the market, and the peaches kept going and the pineapples stood still. I put them down to 5 cents, and I managed to get rid of them at that figure. They weighed from a pound to a pound and a half.

If we put Japan persimmons in the market I am confident we can sell them. We have our minds so fixed on fancy prices. We should put the Japan persimmon on the market so that they could buy a quart of them. It is getting very popular in the North to sell them by the quart. If we can sell them at 12, 15 and 18 cents, they will go.

Mr. Phelps: I have been growing Japan persimmons for a number of years and only once have I been disappointed in the prices in New York. If they are not picked too ripe, they can be sold at living prices. We cannot get fancy prices. I still expect to ship Japan persimmons—probably will ship 200 crates this fall, and expect them to net me $3.00 per crate.

When you have a tree the fruit of which the mocking birds will not touch when ripe, you may as well graft it with a better quality. Opossums and mocking birds are good judges of fruit.

President Taber: There is a good deal of truth in what Mr. Phelps has said in regard to the birds being good judges of fruit. Sometimes it is so good that the birds eat it all.

Mr. Painter: If the remarks of Mr. Putney are true, then the fancy pineapple industry is doomed.

Dr. Kerr: I rise to take up the thread of Mr. Putney's discourse. In regard to New York markets, I am in New York City very frequently during the summer season, commencing with the first of June. As I go along the streets and see peaches which I know to be Southern fruit, I ask the prices.

I will say that anything that goes beyond 25 cents is very difficult to get rid of. Fruit at from 10 to 20 cents will sell very rapidly.

Mr. Bacon: I am very much interested in Mr. Putney's remarks, and I think he might have struck a poor town, and they were suspicious of him, being a new man. There is a great deal in a reputation! Customers can be resolved into two classes—

one wealthy, and the other poor. The poor must have things cheap; the rich must have them high.

A friend of mine had a small store in New York—I should judge that it was on Broadway. I was conversing with him, when a fine, dignified looking gentleman came in and looked at the pears which he had from the Hudson river. "How much are these per barrel," he asked. "Sixteen dollars." "Are you sure they run through the barrel as they are on top?" "Sure of it." "Send them to my house." That was Samuel Tilden. My friend always puts the price up for people who are able to pay for it. So if we are going to have any fancy fruit at fancy prices, it will pay to make the fruit as fancy as possible.

Mr. Putney: I am glad Mr. Bacon has brought this matter up. I don't think that, as Mr. Painter suggests, it will discourage fancy pineapple growers. I have been growing pineapples, and I think we can make a little at 6 cents apiece. A great many are sold at wholesale at 20 cents.

In regard to the class of customers, I will say that this town of which I speak was about thirty miles from New York City, and it contained more wealthy people than any other community without exception. A class to which Rockefeller and those Standard Oil people belong, and other people of considerable wealth. There were not really any poor people in the town. There were well-to-do mechanics, tradesmen and professional men. They all stopped at about 20 cents.

Mr. Phelps: It is not always the men who pay the largest prices who carry the most money. It is the rarest exception. In Sanford I sell a great many peaches, and the men who pay the largest prices are the ones who get their money every Saturday night. It is not the men who are paying them, but their employees who are paying the largest prices. For many years I shipped fancy fruits up about 46th street. I never got the highest prices for them. I know New York and that is very much the case all through. You will find that the best-off people look after the farthings and cents. The reason we have not been getting the highest prices for our fancy fruits in late years, is that the laborers have not been getting as good pay for their labor.

## IRRIGATION.

**For Watering and as a Way of Preventing Frost.**

### A Discussion.

[See minutes, pages 1 to 5, item 81.]

Mr. Bradt: I have something to say in reference to the use of an irrigating apparatus as a measure for frost protection. I thoroughly believe that anyone who is fitted with an irrigating plant need have no fear of frost. I hoped to have tried the experiment

last winter. We talked it over, but did not succeed in getting the experiment made. I believe that if the ground of an orange grove is thoroughly mulched and kept wet through the winter, from December to March, the trees can be kept sufficiently dormant to save them from suffering injury from frost. In addition, if the irrigating plant be fitted with sprinklers twelve hours before and twelve hours after, the trees and fruit can be saved. The question to be decided is if wet mulching will be good. In India they can make ice without chemicals. The only question in my mind is whether simply keeping the ground cold will keep the trees dormant, and that will only be settled by experiment. Perhaps Director Mitchell can give us some light.

Director Mitchell: Regarding the temperature, of course we can answer that low temperatures cause retarded growth. Much would depend on depth of roots—whether surface or otherwise.

Mr. Schmelz: I would like to say, in answer to Mr. Bradt, that I think it is a well known principle that the temperature of the soil does not affect the trees very much, but the temperature of the air retards or accelerates the progress of the tree. With orange trees grown one-half within and the other half without a hothouse, one side would be in bloom and the other would not.

Mr. Moremen: I just want to suggest an idea on keeping trees dormant by refrigeration. Snow around peach trees may form ice instead of simple snow. In the tropics ice is made from wet snow and the process of evaporation. I hope some one who has an irrigating apparatus will make the experiment. I would like to ask Director Mitchell if he knows about the process of making ice in the tropics by wet snow.

Director Mitchell: I do not. That would depend upon chemicals, as here.

Mr. Bradt: No. Simply by placing shallow cans with water in them.

Mr. Lyman: In India they clean off the ground and spread straw upon it and when it is hot, towards evening, they sprinkle it with water and set shallow terra cotta dishes, and in the morning gather the ice.

Mr. Bradt: That shows that the ice is formed by natural means.

Director Mitchell: Referring to India; a great deal depends upon the humidity in the air. Florida is different from India. Cold results from evaporation. The success of the method in India is due to the extreme dryness of the climate.

Mr. Bradt: That is true; but our winter climate is dryer than our summer climate. Our relative humidity is very much less in winter than in summer, and I am confident that we have sufficient evaporation to cool the ground.

Director Mitchell: My opinion is that it would not work in Florida.

# REPORT OF COMMITTEE ON FORESTRY.

Paper prepared by C. A. Bacon, Ormond, Fla.

[See minutes, pages 1 to 5, item 82.]

Mr. President, Ladies and Gentlemen—I have attended these meetings for the past ten years, and I think there has been a Committee on Forestry each year, but when I came to write my portion of this report, I had to refer to Professor B. E. Fernow, Chief of the Division of Forestry in the Agricultural Department for a definition of the word, which he gives as follows: "Forestry is the art of managing forests, or wood crops, using the same rationally, and reproducing them so as to secure continuous supplies."

I am a poor scholar, but now I see where I stand. I have been twenty years trying to raise a forest of orange trees, and just as they were getting large enough for decent back-logs for a fireplace, they were all cut off in one winter, 1895; and again this winter, when they are hardly largely enough for decent stove wood, they are cut off a second time. It is a mystery to me, what this Society has to do with forestry as defined by Mr. Fernow. If you will allow me to give my own definition of the word forestry, as being of the greatest benefit to a majority of the members of this Society, I will proceed. Forestry is the art of planting any tree without having in view, or expecting to derive any benefit or increase from either fruit or nuts therefrom; but for the following objects: to beautify the home surroundings; to improve and beautify the public streets and highways, the making of parks, the growing of windbreaks, and the raising of valuable wood for timber.

Now, Mr. President, we are getting near home, and can talk. I know of a thousand elm trees in New England, and not one of them could you buy for five thousand dollars; and yet at one time they were saplings, and were planted in half an hour. We have two thousand palmetto trees, and you cannot buy them for two dollars apiece. Look at the live oaks at Daytona and New Smyrna; can you estimate their value? Have you seen the water oaks in and about Lake Helen, Orange City and DeLand? How much did it cost to plant them and what is their value now? At City Beautiful, on the peninsula opposite Daytona, Mr. C. C. Post, the proprietor, has transplanted several hundred palmetto trees, twenty or more feet high, and made a boulevard of marked beauty through the sand dunes to the ocean. Mr. Flagler named his hotel palace at Miami "Royal Palm." I doubt if there was one in sight at the time; today you can bask in the shade of the fronds of hundreds. Ormond has planted a double row of palmettoes the whole length of the town; and individuals are transplanting dozens. At

the old Ormond plantation there is a palmetto thirty feet high, Mrs. Ormond planted the seed from which it grew. She was alive two years ago.

We love the trees, they bring the birds, and keep old Sol's fiery darts from piercing us in summer. Gentlemen, you that have no shade trees about your house, deny yourself one day's fishing, and plant a dozen. Your sons will live to say, "God bless the old man!"

I am told that mulberry timber is very valuable. There is none in the market, it is not quoted. For ladder rungs, as the boy said, "it will last forever, I and pa have tried it." We believe, take twenty acres of moderately moist land, and put in mulberry cuttings five by six feet, that in fifteen years a man would have a small fortune. We had a mulberry tree on dry land the trunk of which grew twelve inches in diameter in nine years. By planting the mulberry close together, would they not grow up straight, tall and clean of knots? A mulberry board cut quartering and polished would be beautiful; the yellow and green tints most exquisite. No doubt there are other valuable woods we could raise here in Florida.

Let us generalize a little, and I will close. Within the past month we had a talk with Mr. Charles Mallory, of the Mallory Line. and incidentally he spoke of the destruction of the forests in the "North Woods," or Adirondacks. While there hunting last season he met the owner of three paper pulp mills and asked him how much pulp per day he turned out, and how many spruce trees it took per day to produce it. The reply was, "seven tons of pulp, requiring seventy trees per day." And this firm was only one of many.

In Minnesota and other Western States the large timber dealers buy up tens of thousands of acres of timber lands, cut off the timber, abandon the land, refuse to pay the taxes, and it reverts back to the state. Within a short time the States have taken up the matter, are protecting the young seedlings that come up, and in a few years the land will be more valuable than ever before.

We have always had some doubts about the opinion so often expressed that the deforesting of our timber lands was producing climatic changes, and now comes forward the Chief of our Weather Bureau, Mr. Willis S. Moore, and confirms me in my doubts, and with the reading of Mr. Moore's article I will close, thanking you for your kind attention.

### CUTTING AWAY OF FORESTS NOT THE CAUSE OF COLD WAVES IN FLORIDA.

United States Department of Agriculture, Weather Bureau, Washington, D. C., March 27, 1899.—Mr. John Kendig, L. S. Brooks and others, Citra, Fla: Gentlemen—In reply to your letter of the 19th instant, inquiring whether the cutting of timber in Florida and States to the northward has any effect on the climate, I beg to inform you as follows:

One of the natural results of a geographical position such as Florida possesses, viz., a place on the extreme southern edge of a vast continental area, stretching hundreds of miles to the northward, is that at times there must be incursions of cold air from the interiors of the continent. The causes that operate to produce a cold wave are general rather than local. Deforestation of a region would tend to reduce in a measure the surface friction of cold waves over that region, but we fail to see how the removal of the forest would have any tendency to increase the number and severity of cold

waves. What effect deforestation has upon temperature is not satisfactorily known.

The problem is difficult of solution, for various reasons: First, it must be known to what extent the original forest has been removed; second, what was the temperature before denudation began; and third, what was it afterward. The second one is that which is usually impossible of ascertainment.

The difference in temperature of wooded and treeless regions has been studied to some extent in Europe, but generally the results have not been very satisfactory. One of the conclusions that seem to be definitely established is that the temperature of forested areas is a little lower than treeless districts of the same latitude, and the range of temperature is also less.

The observations also show that the effect of the forest on the temperature is most marked in the warm season.

Observation and theory both lead us to reject the hypothesis that deforestation has caused an increase in the frequency and severity of cold waves. Very respectfully,

WILLIS S. MOORE,
Chief United States Weather Bureau.

## THE EXPOSITION AT OMAHA.

**Florida Should be Represented—Remarks of the State Delegate and Other Members.**

### A Discussion.

[See minutes, pages 1 to 5, item 84.]

Mr. Bacon: The gentleman appointed by the State of Florida as a representative at Omaha is present, and we would like to have the gentleman talk.

Mr. Pfeifer: I don't want to take up your time, but I would like to have very much the concerted action of this Society in regard to this Exposition. In other words, to assure us of your co-operation. To make an effort in your neighborhood to make this Exposition a success. I have voluntarily taken the entire burden upon my shoulders of bringing the resources of our State before the people of the North-west. The railroads have assured us of their co-operation for the transmission of products. I am ready to furnish you with glass jars. I would like to get the sense of the Society in order that I may be sure of your co-operation in this matter. My address is Ocala, and any communication from you will receive my personal attention. I will cheerfully furnish all the information I can in regard to the Florida exhibition at Omaha in 1899.

Director Mitchell: I was at Omaha last fall. We had a convention of the officers of our Bureau. I must say I was disappointed and chagrined to witness the failure of the State of Florida to make an exhibit there. I saw grand displays from all the States west of the Mississippi. I know we would have made a success had we entered. I never saw a single pineapple in the entire exposi-

tion at Omaha. It was a very trying time to appear in the North-west last fall after so many of their troops had died here. I put on a bold front, however. A good many people up there had been prejudiced by reports from the soldiers who had died here last fall. If there had been a Florida exhibit it would have done a great deal of good. I talked with people on the ground and on the train about the resources of the State, its products and its health and the more I talked with them the more eager were they to hear. I feel sure that any step taken in that direction will result in good and will return tenfold.

Mr. Pfeifer: In regard to those exhibits from the North-western States, I want to say here that the exhibits were beautiful in their character, but as the Director says, there were no pines. There were also no grape fruit (pomelo). I saw an exhibit from the State of Oregon, but if we could not have made a better one. just after the freeze, I would want to crawl in a hole and pull the hole in after me. We can claim the attention and respect of the people of the North-west as a State which cannot only produce the necessities of life, but the luxuries as well and things which tickle the palate. I spent six months and twenty days in the North-west in attending the exposition known as the Trans-Mississippi Exposition, and more interest was manifested in Florida and the Southern States in general than you could imagine, and if we had had an exhibit it would have resulted in untold good. I would like to have this matter receive your consideration for a few moments.

Mr. Bacon: I have not the least idea but that everyone in this Society will sanction this movement of getting up an exhibit. I move that the Society draw up a motion that we co-operate with the gentleman appointed by the State of Florida, with the Society's sanction. I would like to hear the expression of each individual by a standing vote, pledging themselves to contribute one thing and to have it ready by July. Rising expression if possible.

Motion seconded.

Mr. Phelps: Comparisons, as the Irishman said, are odorous! When the Plant System made an exhibit at Atlanta, I took twenty-six boxes of the best fruit I had, and among that fruit was one pineapple which weighed fourteen pounds. Today there are not the things in Florida that would make a creditable exhibit among citrus fruits. The people of Florida are just as generous as they ever were. I am not objecting, but cannot see how I can send anything that would be a credit to the State. I love the State too much to wish to send anything which would not reflect credit on it. It is not because we do not wish to do so, but because we cannot. Last spring I wanted to send some Northern people some grape fruit. I could not get a quarter of a box which were fit to put on exhibition.

Mr. Bacon: There is a great country south of Sanford.

Mr. Pfeifer: I have today in this book the names of gentlemen—perhaps two score of them—who have promised to assist me by sending grape fruit, oranges, limes, lemons and tangerines. This will be in an exhibit from the southern portion of the State, and will be sent there during the term between July and November. They will be under my supervision.

Mr. Putney: I will put up some grape fruit marmalade.

Mr. Hart: I have visited a good many expositions from New Orleans to Toronto. from New England to Jacksonville, and I have noticed particularly this matter of

people going to expositions and seeing exhibits made there, and they are almost invariably known to make some remark to this effect: "If I had known they had nothing better than this here, I would have brought my potatoes, my melons, etc," and are astonished that the exhibition is so far below what they could make in that line. At New Orleans I made an exhibit of honey and wax, but did not put beeswax into competition. One of the judges told me that he was ashamed to give premiums to exhibitors of the wax, and that I did not know what I missed by not putting beeswax into competition for a premium. I had some that was very fine. If we will only take what we have, we can make a very creditable exhibit for Florida.

## GRAFTING VS. BUDDING.

[See minutes, pages 1 to 5, item 27.]

Mr. Putney: I would like to endorse what the gentleman says in regard to what kind of trees he would set in the place of the ones dug out. At the time of the freeze, the big freeze of 1895, I bought some Florida rough lemon stocks and budded them. The stocks were about the size of my wrist, or smaller. At the same time I determined to try root-grafting. I cleft-grafted some roots about the size of my thumb and planted them in my pinery, about a hundred of them, as an experiment to see what they would do. They were not watered, and the ground was not in the best shape for them, not being fertile. If they had been planted in the valley of the St. Marys river and had good care they would have made marketable trees. Forty per cent. of those trees are now living and came through the cold of last February in better shape than those worked in any other way. The junction was four inches below the surface and the scion had many roots of its own.

In New York and in the New England States we have two pears, the Anjou and the Duchess, which are improved both in color, size and quality by grafting on the quince stock. It has been claimed by several—including Mr. Phelps—that the orange is improved in quality by being worked on the lemon. This seems reasonable, but the lemon is tender. By placing the junction of the lemon root and orange scion several inches below the surface, the scion will take root also and the tree will be hardier, as was partially proved in my own experience this year. I believe it will be proved quite as hardy as the sweet seedling.

It has been found that the Duchess pear on the quince when planted this way retains the superior character it has when the graft is above the surface. It is then classed as a half standard. May we not retain the superior quality of the orange on the lemon root and have it hardier?

Mr. Mann: I have been in the nursery business for fifty years. If I was in it again I would try the same tricks I used to try in the North. I used to keep apple grafts in the cellar and graft them in the winter and in the spring I would set them out. I would give more for that kind than for those budded above ground. Of course, budwood

is expensive. I would not recommend digging the trees up. I would take them up and set them out. Use three or four inches of root. They root both from the root and from the stock. Sometimes in grafting pear trees, we would put in some pear stocks into apple stocks.

Mr. Richards: A great many people here today are not able to start an orange grove by building green-houses and hot-houses, and I think it would be a kind of slur on Florida climate. While all these professors are here, I think it would be a good plan to find out how far south we will have to go to grow orange trees in the open.

Prof. Webber: It would be impossible to answer that question. I wish we were endowed with the power to do so. If we expect to grow oranges in this section we will have to grow them in hot houses, or have a new orange.

I want to speak on the subject of sheds. Trees in pineapple sheds are blooming and a number of them are in fair condition. One of the questions which interests us here, is not simply a question of the amount of bloom, but the amount of fruit when it sets and the quality of the fruit when it matures. We know that the fruit on the interior of the trees is inferior. We go to the outside of the tree for the best fruit.

A member demurred.

Is that not right? It seems to me that the fruit on the outside of the tree is better —it may be from the effects of the sun or from the effect of the location. It is a well known fact that terminal buds are the strongest. In growing chrysanthemums, if we want to get good flowers, we take the terminal buds. I simply call your attention to it. I should like to stand corrected in the assertion. Judging, however, from the effect of pineapples and strawberries grown under the shed it would seem that the fruit grown under the shed is much juicier and of of a better quality in every way than fruit grown in the open and in the sun. Just as free from insects and very much better in every respect in the sheds than in the open sunlight. The orange tree demands a generous amount of sunlight, but it depends upon the conditions. I have seen trees which were transplanted to dry locations which were utter failures. We cannot expect to change the habits of a tree. We must not take trees up which have been grown in the sun, and transplant them to sheds. I have seen a number of the trees which Mr. Hart has referred to, grown in the vicinity of New Smyrna and Citra and other places, and the fruit under these trees is just as good as the fruit on the outside. If shade is not injurious, I cannot see why sheds should not be used to advantage.

As to root-grafting, perhaps there is a difference in method. I selected lateral roots. They had been frozen and perhaps the roots were not in the best condition, but a large percentage took, and grew nicely. They made quite a vigorous and effective growth. I have some of them still living, but in taking up a number of them from the nurseries to transplant them, I was struck with the fact that they had no tap-root. That seems to be the tendency of lateral roots. We should select tap-roots. The practice of grafting seems to be just as satisfactory as to bud. It is very much quicker and very much better.

President Taber: There are a great many different ways in which trees can be worked over, both by budding and grafting, but it is hard to convey proper information in relation to the various methods without illustrations.

One method that we have tried to a limit-

ed extent this year on large frozen back stocks is to cut a narrow smooth face two or three inches long on the sound wood of the stump close to the ground and nail on a scion cut with a correspondingly long smooth face. We used very fine wire nails or brads about one-half inch in length, two or three to each scion.

If the cut surface of stock and scion are both comparatively even planes it is not necessary to drive the nails in very far as the friction of the nails will hold the scion in place without the heads coming into contact with the scion. A little care must of course be exercised not to bruise the scion with the hammer.

The scion should be placed on the stock so that inside edges of bark on stock and scion will come together on at least one side. If the cut face on the stock is not made too deep—just through the bark and a mere shaving of wood is all that is necessary—the cut of scion will nearly cover the cut face on stock and callus will rapidly form on both edges of stock and firmly unite with both edges of scion. The scions used should be well matured winter cut wood and five to six inches in length.

The results obtained by this method have been very satisfactory and its advantages on large frozen back stocks are that the scions can be nailed on at any time before summer growth commences—or for a short while afterwards—and are held firmly in place without the use of strings. As many scions as desired can be placed on each stump. Moist earth should be pressed around the scions after they have been inserted, leaving only one or two of the top buds exposed.

Prof. Webber: It is not necessary according to the new method to wait until the bark slips; simply insert and wrap it the same as the others. Leave the tape on until the bud takes. By this new method that Mr. Taber tells us about, a bud is put in in a slightly different manner, and, as I think, it is a very great advantage in cases of this character.

## TROPICAL FRUITS.

### How They Were Affected by the Cold.

Mrs. Florence P. Haden, Cocoanut Grove, Fla., Member of the Standing Committee.

[See minutes, pages 1 to 5, item 66.]

As to the effects of the cold weather of February 14th last, at my own home, bananas lost their leaves but fruit that had set already, ripened very well, and new growth began at once. We have several stalks that have bloomed and set fruit since, and our small clump looks about as well now as it did before the frost. Pineapples were uninjured; the ends of some of the leaves and some of the blooms were killed, but not enough to seriously diminish the crop. Tropical pawpaws lost their leaves and the fruit was damaged, some of the young plants were killed, but bearing plants began

to set fruit within two or three weeks. Cocoanut trees lost only their very small fruit and blooms and are rapidly recovering.. No citrus or tropical trees were hurt by the frost. The mango crop for this year was cut short, being in bloom at the time; some fruit set, however, and there has been a second crop of bloom which has set fruit nicely. The avocado pear promises to give us the largest crop for several years. The Jamaica apple is now ripening its usual crop. The sapodilla is bearing as usual, also the mammee apple.

To indicate the extent of our experience, I will give a list of our tropical fruits in addition to those mentioned above now growing on our place here: Rose apple (Eugenia jambos) Surinam cherry (E. Michelli), Spanish lime (Mellicocca bijuga), sour sop (anona muricata), sugar apple (anona squamosa), Bromelia pinguin, tress or canistel, tamarind, dates, cocoa plums and last, but not least, the guava, which is everywhere and produces good crops with or without attention though it does respond gratefully to plenty of food and water, bearing all the year. We have one tree of the araca guava which is growing nicely and was not injured by the frost. It has not fruited yet. We also have one fine specimen of Barbadoes gooseberry.

## JAMAICA SORREL.

By Charles Weiland, Estero, Lee Co., Fla.

To the Florida State Horticultural Society—One of the most promising tropical fruits for South Florida, in my opinion, is the Jamaica Sorrel (Hibiscus Sabdariffa). It belongs, as its name indicates, to the hibiscus family, which can be easiest recognized by its beautiful flowers. As it is an annual, an occasional freeze will not discourage one from planting it again. Every part of the plant except, perhaps, the roots, can be utilized. The fruits or calyxes can be used for everything that a cranberry will serve, and even has a better flavor, besides requiring a much smaller amount of sugar. A very fine jelly can be made of the fruit. The leaves can be cooked as greens. The stems and offal can be made into vinegar. We have also made a fine wine of the fruit and its crimson color gives it an odd appearance. It bears an enormous quantity of fruit and one can well count on a quarter of a bushel per plant. In rich soil it will attain a large size and should therefore be planted about ten feet apart. The seeds should be planted as early as possible so as to get the fruit for the Thanksgiving turkey dinner. Another peculiarity about the plant is that branches broken off and rooted will bear fruit at the same time the parent plant does.

Taking it all in all, Jamaica Sorrel is a great plant and should be tried by everybody, especially for house use and as an ornamental.

# MELON CULTURE.

Paper prepared by C. H. Baker, Grasmere, Orange County, Fla.

[See minutes, pages 1 to 5, item 75.]

Mr. President, and members of the Florida State Horticultural Society—Since a function of our Society, and one in which it has ever stood to the front, is to foster all branches of horticulture, the writer begs to mention one that is certainly deserving, but which, as far as he is aware, has not yet received merited encouragement. This is melon culture.

Melons, including both musk and watermelons, are amongst the fruits most largely known and used by man. Their culture is spread extensively throughout the world and is, in some countries, made a marked specialty, characterized by more favorable peculiarities and devices than are employed in growing other fruits.

Melons are already grown in Florida, but although the culture seems to be increasing and to employ a fair amount of capital, it is still far behind possibilities; for our soils are peculiarly adapted to it. Many varieties can be grown here to perfection that cannot be equally well grown elsewhere and the tendency is towards the development of new characters. Some of the finest of our watermelons have originated in Florida, and seed farming is already conducted with success and ability.

Many of the finest sorts grown in the warm climates of foreign countries amongst them probably the finest in the world, can be produced in Florida, and with the proper shipping facilities that would be forthcoming on demand opportunity exists for developing special trade that is likely to be very remunerative.

The United States Department of Agriculture has during the past two years secured seeds of a long list of fruits, including the choicest varieties of Southern Russia and Central Asia, many of them inaccessible to private parties, which may have a very decided effect upon melon culture in the United States. A number of these have been fruited in Florida and others are expected to fruit this season, so that improved sorts adapted to our varied conditions may subsequently be determined.

All things considered there would seem to be no reason why melon culture in Florida should not reach the same financial success as has been reached by the growers of Colorado with the Rocky Ford melons during the past two years, whose product reaches Eastern markets in approved packages in perfect condition, and is largely, if not wholly, contracted for in advance.

The writer has long been interested in this branch of horticulture and has for sev-

eral years been growing melons selectively. Were he present he would make the necessary motion; this being, to his great regret, impossible, he begs leave to suggest, and to urge, that a committee of three be appointed to consider and promote the interests of melon culture.

## REPORT OF THE SECRETARY.

H. G. HASTINGS.

From May 4, 1898 to January 1, 1899.

[See minutes, pages 1 to 5, item 31.]

This report of the Secretary covers the time from the report made at the last annual meeting to January 1, 1899.

The work of the Secretary's office during that period was largely of a routine character as has been given in the Secretaries' reports in past years. After being duly authorized by the Executive Committee, your Secretary made contracts for the printing of the report of the meeting of the Society held at Orlando, May 3, 4, 5 and 6, the report being published in the style and general character of the reports of recent years and which we believe have been a credit to the Society and has added to its prestige.

It was the desire and aim of the Secretary to place the report in the hands of the members at an earlier date than last year but this was found to be impossible, owing to the slowness with which members returned the corrected manuscripts of their remarks made during the meeting. As soon as the reports were delivered to me by the printer, copies were immediately mailed to all members and complimentary copies sent to those papers of the State that have shown an interest in the work of the Society by repeated publications of the notices of the Society meetings and the annual reports.

Your Secretary found that, owing to increasing business cares that were especially heavy at the time when the most effective work must be done by the Secretary in working up the membership of the Society, it was impossible for him to carry on the work of the Society as it should be done; and after due consideration presented his resignation to President Taber to be placed before the Executive Committee for action, such resignation to take effect January 1, 1899.

We regretted extremely the apparent necessity of this step, but we considered that the best interests of the Society demanded a man in the Secretary's office who could give the work all the attention necessary at certain critical times of the year, hence we thought it for the best interests of the Society that we resign.

I wish to take this opportunity to thank the Society for the honor which they have shown me in calling me to fill this office and I beg to assure you that this honor is fully

appreciated and now that I have been relieved from official connection with the Society, I beg to assure you that I will, as in the past, do all that I can to further the interests of the Society.

The financial transactions of the Secretary's office from the time of the last report up to January 1, 1899 are as follows:

| | |
|---|---|
| 1 Life Membership | $10.00 |
| 75 1898 An. Memberships | 75.00 |
| Sales of Ex. copies to Mem. | 12.85 |
| Donation from G. L. Taber | 10.00 |
| | $107.85 |
| 1898. | |
| Dec. 2. Turned over to Treasurer | $35.00 |
| May 3. Turned over to Treasurer | 72.85 |
| | $107.85 |

## REPORT OF SECRETARY.

STEPHEN POWERS.

[See minutes, pages 1 to 5, item 69.]

Upon the resignation of Mr. H. G. Hastings, January 1, 1899, I was appointed by the Executive Committee as his successor. I foresaw that, under the circumstances, in the State at large, it would require an unusual effort to keep the list of active membership up near the standard of former years. But I did not believe the horticulturists of Florida, if properly appealed to, would allow so useful an association to lapse; and the result has justified my anticipations.

First, I had 5,000 small slips printed, calling attention to the objects and merits of the Society, and soliciting subscriptions for the published Report of 1898. A large number of these was taken by the merchants of Jacksonville, who kindly offered to insert them in their business letters, thus giving them wide distribution throughout the State.

The usual circulars of notification and information were sent to members, and an urgent appeal made to them to exert their influence in bringing in new members.

A circular was addressed to the editor of each newspaper in the State, calling attention to the approaching meeting in Jacksonville, and the response to it was very general, few papers failing to publish the notice in their columns, some giving it two or more insertions. The Times-Union and Citizen and the Florida Agriculturist made repeated kindly mention of the Society and its mission.

Mr. George W. Wilson, editor-in-chief of the Times-Union & Citizen, became deeply interested in having a successful meeting; he voluntarily furnished the Society a stenographer and put forth active exertions to secure the presentation of an attractive program, in addition to the regular exercises of the Society. The Society will, no doubt, make official recognition of the graceful courtesies and hospitalities accorded by the Jacksonville Board of Trade and their wives and the individuals who took part in repeating, for the special benefit of the Society, a dramatic entertainment.

Mr. C. M. Marsh, of Lakeland, merits the

thanks of the Society for his enterprise in securing two life memberships in Mexico.

Renewals and new memberships have come in at a gratifying rate, showing that the growers of Florida still have faith in their great and commanding industry. So earnest were the old members that several certificates were ordered by telegraph at the last moment. I am pleased to be able to report a paid-up membership, up to date, as follows:

| | |
|---|---|
| Annual members | 315 |
| Life members | 34 |
| Honorary members | 2 |
| Total | 351 |

RECEIPTS.

| | |
|---|---|
| Annual memberships | $315.00 |
| Life memberships | 40.00 |
| Donation from Amos Wakelin, of Philadelphia | 3.00 |
| Total | 358.00 |

EXPENDITURES.

| | |
|---|---|
| Postage, envelopes and postal c'ds. | $ 17.57 |
| Freight and drayage | 40 |
| Printing 300 postal cards | 75 |
| Printing letters and circulars | 2.25 |
| Printing Cer. Cir. and slips | 12.00 |
| Printing 5,000 slips on both sides | 7.50 |
| Printing 300 badges and 400 Pro | 15.50 |
| Total | 55.97 |

TURNED OVER TO TREASURER.

| | |
|---|---|
| Bank account | $236.45 |
| Cash | 65.58 |
| Total | 302.03 |

Respectfully submitted.

Papers that published notice of the Horticultural Society's meeting:

Sumter County Times.
Orlando Reporter.
Baker County Press.
Gainesville Sun.
DeFuniak Herald.
Orange City Times.
Tallahasseean.
Florida Star.
St. Augustine Daily Herald.
Punta Gorda Herald.
Madison Recorder.
New Smyrna Breeze.
Green Cove Springs.
Sanford Chronicle.
Quincy New Era.
Starke Advocate.
Miami Metropolis.
Leesburg Commercial.
Kissimmee Valley Gazette.
Daytona Gazette-News.
Bartow Courier-Informant.
Levy Times-Democrat.
Lakeland Sun.
Ft. Myers Press.
St. Andrews Buoy.
Palatka Times-Herald.
Ocala Star.
Ocala Banner.
Belleview News-Letter.
Halifax Journal.
Eustis Lake Region.
Indian River Advocate.

Outside of the state: Country Gentleman, American Agriculturist, Green's Fruit Grower, Coleman's Rural World, National Stockman, Riverside, (Cal.) Press.

# ANNUAL REPORT OF TREASURER FOR 1899.

W. S. HART.

[See minutes, pages 1 to 5, item 68.]

In account with Secretary H. G. Hastings.

| | |
|---|---|
| 1898. | |
| May 4. To Bal. at time of last report | $197.91 |
| Dec. 3. To check received of Sec'y.. | 35.00 |
| 1899. | |
| May 3. To cash of Sec. Hastings in final settlement..... | 72.85 |
| Total ..... | 305.76 |

CR.

| | |
|---|---|
| 1898. | |
| Sept. 20. By Sec'y Hastings' draft No. 17 ..... | $ 50.00 |
| Oct. 3. By postage on proofs and other documents ..... | 1.00 |
| Dec. 5. By Secretary Hastings' draft No. 18 ..... | 198.65 |
| May 3. By paid attached audited bills | 64.91 |
| May 3. By Paid Sec'y Hastings balance due him from last settlement as per annual report..... | 10.00 |
| Total..... ..... ..... | 324.56 |
| Loan from Treasurer..... | 18.80 |

In account with Secretary S. Powers.

DR.

| | |
|---|---|
| May 4. To total receipts from Sec'y. | $358.00 |

CR.

| | |
|---|---|
| May 4. By bills of printing, postage, freight, etc., as per attached bills. | $ 55.97 |
| May 4. By returned loan from Treas | 18.80 |
| May 4. By balance now in treasury | 283.23 |
| May 4. ..... | 358.00 |

# EXECUTIVE COMMITTEE'S ANNUAL REPORT.

[See minutes, pages 1 to 5, item 63.]

The Executive Committee has held three meetings since its last report. The first meeting was held in the San Juan Hotel, Orlando, May 6, 1898.

At this meeting the stenographer's bill was approved and the Secretary instructed to draw a draft on the Treasurer when the transcribed report should be placed in his hands, and the President and Secretary were authorized to make arrangements for the publication of the report of the 1898 meeting in the usual manner, except in the

omission of a catalogue as ordered by the Society.

The second meeting was held at Jacksonville, November 27, 1898; present, Messrs. Hubbard, Stevens, Hart, Taber and Hastings. The bill of E. O. Painter & Co., for printing report of 1898, was presented, approved and a draft drawn on the Treasurer. The resignation of Secretary Hastings, to take effect January 1, 1899, was read and accepted, and Messrs. Taber and Hubbard were appointed a committee to make arrangements for filling the office.

The time of next annual meeting at Jacksonville was designated for May 2, 3, 4 and 5, and Messrs. George W. Wilson and Lorenzo A. Wilson were named as a committee of local arrangements.

The question referred to the Executive Committee by the Society, of qualifying lady relatives of members without payment of dues, to receive the courtesies extended to regular members, was decided adversely.

The third meeting was held in Jacksonville, May 3, 1899. The request of Mr. Frederick Pfeifer, of Ocala, Commissioner of Florida for the Greater America Exposition at Omaha, July to November, 1899, for addressing the Society was granted subject to call of the President.

The bill of Ex-Secretary Hastings for expenses to January 1, 1899 was approved, and Mr. Hastings authorized to deduct the amount from receipts in his hands, the balance to be turned in to the Treasurer. The meeting then adjourned to end its morning session, and appointed Profs. H. A. Gossard and P. H. Rolfs and Messrs. E. O. Painter, E. L. Wartman and M. S. Moremen a committee to report on a bill for quarantine and destruction of plant diseases and insects, to be approved by the Society for passage by the Florida State Legislature.

This covers the active work of this Committee during the past year.

LYMAN PHELPS,
E. S. HUBBARD,
H. B. STEVENS.

## ELECTION OF OFFICERS.

[See minutes, pages 1 to 5, item 62.]

The nominating committee, consisting of Benj. N. Bradt, H. G. Hastings and E. S. Hubbard, presented their report, nominating the following ticket:

For President—Geo. L. Taber, Glen St. Mary.

For First Vice-President—Dr. George Kerr, Pierson.

For Second Vice President—George W. Wilson, Jacksonville.

For Third Vice-President—E. N. Reasoner, Oneco.

For Secretary—Stephen Powers, Jacksonville.

For Treasurer—W. S. Hart, Hawks Park.

For Executive Committee— Lyman Phelps, Sanford, Chairman; E. S. Hubbard, Federal Point; H. B. Stevens, DeLand.

On motions made by various members the Secretary was instructed to cast the vote of the Society for each of the above-mentioned gentlemen in turn (the Treasurer be-

ing instructed to cast the vote for Secretary), whereupon they were respectively declared elected and accepted the offices with a few felicitous words of thanks.

## NEXT PLACE OF MEETING.

**Jacksonville Selected.**

[See minutes, pages 1 to 5, item 53.]

A member suggested that the annual meeting be held in April. The President stated, and several members confirmed the statement, that the railroads would not give any reduction in rates in April, owing to the fact that Northern tourists are then still in the State and they take advantage of these rates by becoming members of the Society.

Mr. C. E. Garner: Mr. President, I believe that the Board of Trade of this city would wish to extend a most cordial invitation to the Society to hold its next meeting in our city. We have heard it said that there are other places in the State of Florida—and other people, besides the city of Jacksonville, but we do say this, that all roads lead to Jacksonville. We have six railroads coming into the city, and if you do choose this place there is no place in the State of Florida and no people anywhere who will give you a warmer welcome than we.

Mr. Phelps: I move that we accept that invitation. I believe that if the vote of the entire State of Florida were taken, three-fourths of them would vote not only to have our annual meeting here, but that the capital be moved to this city. (Applause.)

Mr. Neeld: I would like to call your attention to this fact, that the West Coast of the State of Florida is entitled to some recognition, but I have no recollection that the Society has ever held a meeting on the West Coast. Tampa is a place of some importance also.

I think this written invitation from the little city of St. Petersburg, on the sub-peninsula, is worthy of consideration. (Reads paper.)

ADVANTAGES OF ST. PETERSBURG.

St. Petersburg sends Wm. P. Neeld, one of its oldest citizens and the pioneer tropical fruit grower of the United States, to sing the praises of the Pinellas Peninsula to the world. While peninsulas enjoy water protection, sub-peninsulas are permanently exempt from cold ravages. The "sub," by reason of its topography, as well as its geography, enjoys immunity of this kind. The blizzards that hatch, as it were, in the Dakotas and run wild across the State of Texas, dash across six or seven hundred miles of the warm waters of the Mexican Gulf, thus mingling the frigid with the temperate air till it loses its terrors to tropical trees, except on rare occasions, as in '68, '86 and '94. Contemplating the configuration of the St. Petersburg Peninsula, we find its narrowest part just at its juncture with the mainland. We can imagine how it may be that the cold in "rapid transit" south strikes this narrow place twenty miles

north of St. Petersburg, and the dense, heavy cold current, seeking the lower and unobstructed route, separates, and while one volume goes down Tampa Bay, the other just keeps along the gulf and the little Coast Bay, which reaches all the way of the peninsula's length, while the warm air rises on either side and is perhaps held in warm vapors over the elevated land.

Whether this theory is correct or not does not matter so much as the fact that the orange groves of this section were never so perfect and so fine as they are today. Tropical fruits promise a rich harvest another year, while lime and lemon trees were not killed and grape fruit buds were not in the least injured. All of which we invite the world at large and the State Horticultural Society in particular to come and see. The keys of the city will be formally turned over to you and we will endeavor to minister to your physical comfort and enjoyment in the highest degree. Come to St. Petersburg, May 2, 1900.

There are many attractions to Northern people down there, and there ought to be for you on the beautiful Manatee river, one of the most beautiful in the world. This alone would be quite an attraction to the people to take a boat excursion down this lovely river.

Mr. Hart: I heartily endorse the idea of making Jacksonville our general headquarters, and come here almost every year. But whether it is best to come here every year or not I don't know. We have been to Pensacola and Orlando, but we have never been over on the southwest coast. Many would be very glad indeed to go there on a low rate to attend one of our meetings. If we did not go for any other object, we might, by going there, add to our membership. Jacksonville people like us so well that they will stay with us anyway.

Mr. Westlake: Jacksonville is not the geographical center of the State, but it is the center of business and commerce of the State, and all roads lead to Jacksonville. It is more accessible, and is able to accommodate larger crowds. I would like to see it our permanent place of meeting.

Mr. Gurney: I hope we will come to Jacksonville. It took two days for us to go to Orlando, and two days to come back. I can come and go back from Jacksonville in two days.

Mr. Garner: I will say this, that unfortunately at this time our meeting room here is not in good condition. We have our plans made for putting it into good condition, and if you gentlemen come here next year I can assure you that you may have the use of this room, not only next year, but every year, and have it in first-class condition.

Mr. Westlake: I move that we take a rising vote.

Seconded and carried.

Jacksonville chosen. (Applause.)

# SPECIAL RESOLUTIONS.

[See minutes, pages 1 to 5, items 49, 50, 71, 72 and 83.]

### THE FLAGLER RESOLUTION.

The following resolution was introduced by Dr. George Kerr, of Pierson, Volusia county:

Resolved, That as Mr. H. M. Flagler has announced his intention of becoming a permanent citizen of Florida, the Horticultural Society desires to formally congratulate the State on his decision to cast his lot among us. Recognizing his great service to our industrial development, we cordially welcome him, believing that our destinies shall become linked with his in those bonds of interest that citizenship implies.

The resolution was unanimously and enthusiastically adopted.

The above resolution was wired to Mr. Flagler in New York and the following response was received:

### TELEGRAM OF RESPONSE.

New York, May 5, 1899.

To President Taber, State Horticultural Society, Jacksonville, Fla:

The cordial welcome which has been extended to me since the declaration of my intention of more closely identifying myself with the State of Florida by becoming one of its citizens has been a source of much gratification to me, and it is with great pleasure now that I am called upon to express to the State Horticultural Society my grateful acknowledgement of the resolution unanimously passed by your board at its annual meeting. I beg you will convey to the Society my sincere thanks for the kindly expression which is most fully reciprocated.

H. M. FLAGLER.

---

### COTTONY CUSHION SCALE.

The following resolution was offered by Mr. E. L. Wartman:

Whereas, It is known to the members of this Society that the cottony cushion scale has obtained a foothold in this State; knowing full well the thousands of dollars of loss to the State of California caused by other insect pests, we feel the importance of having this bill passed by the present Legislature.

Resolved, That we urge every member of this Society at once to write their representatives, urging upon them the necessity of this bill and requesting their hearty support in its passage.

Adopted.

---

### OUR GOOD ROADS.

Offered by W. P. Neeld.

Whereas, the object of life is happiness, and one of the greatest sources of such is quick and easy transportation, therefore be it,

Resolved That the Florida State Horti-

cultural Society pledges on the part of its individual membership its hearty approval and co-operation with the laudable work of the Good Roads Convention of workers in this State. We believe that the ends will justify any reasonable means that may be employed to this purpose.

Adopted.

ANOTHER ON GOOD ROADS.

Offered by B. N. Bradt:

Moved, that the Executive Committee be requested to consider the propriety of establishing a Standing Committee on Good Roads, or refer the question of good roads to the committee on transportation to be reported upon.

Carried.

## FINAL RESOLUTION.

[See minutes, pages 1 to 5, item 70.]

Mr. President and Members—Your Committee on Final Resolutions begs leave to submit this report.

Resolved, That the thanks of this Society are due and are hereby tendered to the Press of the State of Florida for its many notices of the Society meetings and its words of commendation.

Resolved, That the thanks of this Society are hereby tendered to the Times-Union and Citizen and its editor, Mr. George W. Wilson, for the able reports of the sessions that have appeared daily, and for his especial kindness in furnishing the services of a stenographer so that the proceedings may be reported in full for the benefit of the Society.

Resolved, That the thanks of this Society are hereby extended to the general passenger agents of the several railroads for the reduction in their rates.

Resolved, That this Society hereby extends its most heartfelt thanks to the Board of Trade as the representative of the City of Jacksonville for their able and successful efforts in providing for the comfort of our members, and the conveniences they have afforded for conducting the meetings of the Society; also to the hotels of the city for reduction in rates.

Resolved, That our thanks are especially extended to the wives and daughters of the members of the Board of Trade for the active part they have taken in providing so extensively for our recreation and entertainment during our visit to Jacksonville.

J. WILLIS WESTLAKE,
E. E. PRATT,
H. G. HASTINGS.

# NECROLOGY.

[See minutes, pages 1 to 5, item 85.]

Offered by E. O. Painter:

Resolved, That the Secretary be instructed to have a memorial page set aside in commemoration of our fellow members, Mr. H. G. Hubbard and Dr. D. O. Davies, who have, since our last meeting, passed to their reward.

Adopted.

## HENRY GUERNSEY HUBBARD.

Born May 6, 1850, he developed from boyhood a remarkable interest in natural history, and even at an early age showed that fineness and delicacy of observation that distinguished the scientific work of his maturer years.

After graduating at Harvard, in 1873, he remained at Cambridge as a graduate student in his favorite scientific branches, especially enjoying the friendship and encouragement of Louis Agassiz and Asa Gray. His real life work began in Florida in 1880, where he soon achieved a wide reputation, both as a practical horticulturist and as a scientific investigator in the economics of orange culture. In fact, his discoveries and inventions can be said to have revolutionized this branch of horticulture.

In 1881 he was engaged as a special agent for the Division of Entomology by Dr. C. V. Riley, working first on cotton insects and afterward on those injurious to the orange. The results of the latter study were published by the Department in 1884 in a bulletin, Insects Affecting the Orange, which is a familiar text-book and authority in every orange growing section of Florida —an invaluable work. For over a year before his death he had been working on a revised and greatly enlarged edition of this volume, which was to include the insect pests of the citrus family in every country where the orange grows. It was in the course of his work on the first edition that he discovered and perfected a practical method of emulsifying kerosene so as to allow its dilution with water for insecticide purposes.

Always on the lookout for unusual faunas, that of the Hot Springs in the Yellowstone Park was studied in 1890 and 1891, and a year later a trip through the North-west with Mr. Schwartz, yielded accumulations which have not been even yet reported upon.

The burrows made by the Florida land tortoise or "gopher" were investigated in 1895, and an altogether new fauna was there discovered. A new visit to the Lake Superior region in 1896 resulted in an admirable study of a coccid infesting the birch, and this was followed in 1896 by a study of the "ambrosia" beetles, opportunity for which was given by the enormous increase of these beetles in the dead and dying trees, killed or seriously injured by the "great freeze," which caused a loss to Mr. Hub-

bard and other orange growers of many millions of dollars.

In 1896 pulmonary consumption first took hold of him, and Mr. Hubbard was compelled to spend the winter in Southwestern Arizona, where he immediately began an investigation into the fauna of that region, and discovered an unsuspected mine in the giant cactus.

During his last years in Florida his efforts had been directed chiefly toward importing trees and plants, chiefly from the West Indies and Japan, not only for ornamental purposes but also for food and industrial uses. He took great pleasure in this work. His camphor grove was the largest in Florida and his gardens at Crescent City probably contained the fullest and most instructive botanical collection in the state, if not in the entire South.

He was an earnest member of the State Horticultural Society, and strove never to miss a meeting.

For over ten years he had been senior warden of the Church of the Holy Comforter, and his life was a constant illustration of the noblest type of Christianity. His benefactions to his fellow men were many and great, but always unostentatious.

His Northern home was in Detroit, and a friend contributed to the Detroit Journal a memorial which closes as follows:

"Singularly gifted in that indefinable quality which we call magnetism, he could interest the most indifferent by accounts of his work and discoveries, or if the talk was in a lighter vein, his uniform gayety and originality lent a charm to his most careless utterances.

"As a contributor to the advancement of science, his forte lay in a field peculiarly his own, a field where keenness and delicacy of observation were all important. His papers read before scientific clubs and associations were models of fine scientific treatment and also unusually interesting to the general public.

"Lovely in character and a true idealist as man of science or man of affairs, he lived a life equally noble and unselfish.

"He scarce had need to doff his pride or
slough the dross of earth,
E'en as he trod that day to God, so walked
he from his birth.
In simpleness and gentleness and honor and
clean mirth." T. H. P.

He left beside his widow, four children, two sons and two daughters, the younger son bearing his father's name.

### REV. D. OWEN DAVIES, D. D,

On April 28, 1898, while serving as pastor of the Prytania Street Church, of New Orleans, La., Dr. Davies passed away. His illness was short. As a last desperate remedy a surgical operation was performed, from which he never fully rallied.

The funeral ceremonies were conducted by Rev. B. M. Palmer, assisted by Rev. Drs. Mallard and Nall. The remains were laid at rest in beautiful Metarie Cemetery.

Dr. Davies was born in Baltimore, Md., October 10, 1834. He was educated at Princeton College, graduating both from the collegiate department and the theological seminary. He was ordained in St. Louis, Mo. He preached successively in Baltimore, Md., St. Louis, Mo., Cincinnati, O., Paris, Ky., Clarksville, Tenn., Henderson, Ky., Fernandina, Fla., and New Orleans, La.

He was ministering to the Third Church of Cincinnati when the Civil War began. Being an ardent Southern sympathizer, he resigned his charge and removed to Kentucky. While pastor in Paris, Ky., he mar-

ried Hetty Nicholas, daughter of Governor Richard Hawes. It was largely through Dr. Davies' untiring efforts that Stewart College (now known as the Southwestern University) was reopened. He was also one of the directors of Kentucky Central University.

In 1870 he visited Florida and became deeply interested in orange culture. He published a long series of articles in the Louisville papers, which were extensively read. He was deluged with letters of inquiry, and was instrumental in sending many to Florida. In 1880 he purchased two orange groves on the Ocklawaha river, in Lake county. In 1896 he became an enthusiastic member of the Florida State Horticultural Society.

He was a voluminous writer for church papers and to some extent for the secular press; was also the author of many pamphlets on literary and religious subjects.

Dr. Davies was of a cheerful and lively disposition, full of innocent mirth. He will long be remembered in horticultural circles in Florida for the heroic struggle which he made to save his orange grove in the freeze of February, 1895, by keeping up a great wall of fire along its northern border. His gallant fight was crowned with success.

# FLORIDA STATE HORTICULTURAL SOCIETY.

1899.